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JUNE 1993

SUMMARY OF THE 1992 NORTH PACIFIC ALBACORE FISHERIES DATA

By

Gary M. Rensink and Forrest R. Miller

ADMINISTRATIVE REPORT LJ-93-12

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JUNE 1993

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INTRODUCTION

During the 1992 north Pacific fishing season (May-October), over 350 logbooks were distributed by the Western Fishboat Owners Association (WFOA) and port samplers throughout California, Oregon, Washington, and Hawaii to U.S. albacore fishermen for voluntary record keeping. Logbooks were collected, or information from vessel logbooks were abstracted, by representatives from the California Department of Fish and Game (CDFG), Washington Department of Fisheries (WDF), and the Oregon Department of Fish and Wildlife (ODFW) from almost 300 fishing trips. Landings were also sampled for sizes of fish. National Marine Fisheries Service (NMFS) observers on board albacore vessels also filled out logbooks and measured fish landed.

This report is a summary of data for the 1992 fishing season. Available data from foreign fisheries are also presented for comparison.

COVERAGE RATES

Samplers collected catch and fishing effort statistics from vessels who completed U.S. Pacific albacore logbooks or abstracted fishing information from vessel logbooks, and measured lengths of individual fish (fork length) from landed catches. Coverage rates for catch and effort and length-frequency statistics were calculated as the ratio of sampled landings in weight to total landings.

Catch-and-effort and length-frequency statistics from the U.S. north Pacific albacore fishery were collected at landing ports throughout California, Oregon and Washington. NMFS observers on board three U.S. troll vessels (jigboats) also completed U.S. Pacific

Albacore logbooks, and recorded length-frequency, gillnet damage, and various other data¹. The majority of the landings were from jigboats, while very small quantities of albacore were landed from gillnet boats and vessels using a combination of bait and jig fishing gears (Table 1). The overall sampling coverage for catch-and-effort information was 38% in 1992 (Table 2), a decrease from 62% in 1991². Length-frequency sampling coverage was 42% in 1992, a decrease from 61% in 1991. Sampling coverage decreased due to the larger number of unsampled smaller vessels landing albacore, and because of their more frequent use of ports that did not have samplers available.

TOTAL CATCH AND EFFORT

The 1992 U.S. north Pacific albacore fishery started in mid-May and continued through early November. The 600+ vessels participating in the fishery expended an estimated 15,800 days fishing (total landed weight/albacore average weight/fish per day) compared to approximately 8,900 days fishing expended by 200+ vessels in 1991. In 1992, catches were highest in August, roughly 50 - 200 miles off the coast of northern Oregon (Figures 1a-h). Catches from the commercial fishery were 4,572 mt for 1992, up 148% from the 1,845 mt landed in 1991 (Table 3). Sport catches in 1992 occurred sporadically along the U.S. west coast, but the tonnage that was landed is unknown. Incidental amounts of skipjack tuna (*Katsuwonis pelamis*), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*Thunnus obesus*), kawakawa (*Euthynnus attinis*), amberjack (*Seriola dumerilii*), striped marlin (*Tetrapturus audax*), yellowtail (*Seriola lalandi*), and mahi mahi (*Coryphaena hippurus*) were recorded in the catch of vessels traveling north to the fishing grounds from Hawaii. Small amounts of skipjack tuna and mahi mahi were recorded in the catch on the fishing grounds.

Data from most of the foreign north Pacific albacore fisheries are available only through 1990 (Table 3). Japanese longline and gillnet catches of albacore have remained stable since 1986. Japanese baitboat catches of albacore rebounded to 17,779 mt in 1992 compared to 7,751 mt in 1991.

CATCH PER EFFORT

Estimates of catch per effort (number of fish landed per day fished) for U.S. jigboats in the north Pacific are independent of vessel size and are the ratio of catch to effort in each 1° square and month. Annual estimates are an average of all months and 1° squares where fishing occurred. The overall catch rate in 1992 (54 fish/day) was higher than the 36 fish/day recorded for 1991 (Figure 2). The highest nominal catch rates in 1992 occurred roughly 700 miles west of northern California in July (150-190 fish/day), and approximately 200 miles west of central Oregon in October (160-205 fish/day)(Figures 3a-f). These areas

¹ Bartoo, N. and D. Holts. 1993. Report on the 1992 Cooperative north Pacific Albacore Observer Project. NOAA Admin. Rpt. LJ-93-04. 14p.

² Rensink, Gary M. and Forrest R. Miller. 1992. Summary of the 1991 north Pacific albacore fisheries data. NOAA Admin. Rpt. LJ-92-30. 36p.

were much closer to the coast than where some of the highest catch rates (155-260 fish/day) were recorded in 1991.

LENGTH FREQUENCY

Over 41,000 albacore were measured for fork length (tip of snout to fork of the tail) from the landings of vessels participating in the 1992 U.S. north Pacific fishery (Table 1). Port samples accounted for 63% of the fish measured, while NMFS observers at sea accounted for the rest. Length-frequency data were summarized by gear and 5-degree latitudinal bands for inshore (east of 140°W) and offshore (west of 140°W) areas. The average fork length of fish measured decreased from 12.6 lbs. (65.1 cm) in 1991 to 11.8 lbs. (63.7 cm) in 1992 (Figure 4). Fish ranged in size from 47 to 122 cm (Figure 5).

U.S. troll landings in 1992 consisted primarily of albacore with a single mode centered around 63 cm which probably included 2- and 3-year- old fish, as opposed to two distinct modes centered around 62 and 76 cm in 1991 (Figures 6 and 7a). Vessels using a combination of bait and jig gears landed fish with a similar size distribution (Figures 6 and 7b). Catch from vessels using gillnet gear consisted of too few individuals sampled to generate a meaningful histogram. The larger fish (>70 cm) did not show up at the north Pacific albacore fishing grounds as they had in the two previous years.

SEA SURFACE TEMPERATURE

Sea-surface Temperatures (SST's) recorded from commercial transport ships, fishing boats and research vessels were compiled into monthly means and analyzed by computer. Contours of SST's (isotherms) were drawn with 1° latitude-longitude resolution on charts by computer. Analyses of the mean SST's (Figures 8a-e) show the distribution of isotherms and the location of surface ocean fronts. Areas where albacore catch was in 1992 by the U.S. north Pacific albacore fleet are cross-hatched on the SST charts to show the relationship among areas of fishing, surface ocean fronts (close, horizontal packing of isotherms) and SST isotherm patterns.

The first albacore were caught in July 1992 along the southern boundary of the subarctic ocean front from 37°N to 43°N between 130°W and 165°W. In this offshore area SST's were 1° to 2°C (1.8° to 3.6°F) below normal west of 150°W where the frontal boundary was strong, and SST's were near normal east of 150°W where the ocean front had become quite weak.

During August albacore fishing shifted eastward to the offshore region north of 40°N and east of 140°W where SST's were near normal except along the U.S. west coast. In the coastal region from Vancouver Island to Monterey Bay SST's were 1°C below normal due to coastal upwelling which began about 1 month late in 1992. In August fishing was beginning to concentrate around the 15°C (59°F) isotherm (Figure 8b) where the strongest surface ocean front had developed. At this time SST's were near normal to the east and west of the 15°C isotherm.

By September coastal upwelling of colder subsurface water was well established in the coastal region north of 40°N. The most active fishing was again concentrated around the 15°C isotherm where the coastal ocean front was most pronounced during September. In the offshore area SST's were 1° to 2°C below normal as a result of coastal upwelling.

During October albacore fishing was concentrated in offshore areas from Vancouver Island to Cape Blanco where SST's less than 15°C reflected the remaining upwelling and ocean frontal boundaries which had weakened since September. By November SST's were near normal and coastal upwelling along the U.S. west coast had disappeared except between Cape Blanco and Cape Mendocino.

SUMMARY

The 1992 U.S. north Pacific albacore fishery landings (4,572 mt) represented a 148% increase from landings in 1991, and the best landings total since 1988. Overall catch rates were 54 fish/day in 1992 compared to 36 fish/day in 1991. A 6% decrease in the average size of albacore caught (12.6 lbs. in 1991; 11.8 lbs. in 1992) occurred. U.S. north Pacific albacore sampling coverage decreased from 62% and 61% in 1991 to 38% and 42% in 1992 for catch and effort and length-frequency respectively. Stronger ocean frontal boundaries inshore between Vancouver Island and Cape Mendocino probably contributed to a greater concentration of albacore east of 135°W in 1992 than in 1991.

ACKNOWLEDGEMENTS

We thank the captains and crews of the U.S. north Pacific albacore fishing fleet, William Perkins of the Western Fishboat Owners Association, and the American Fishermans' Research Foundation (AFRF) for their cooperation and continuing support of this program. We thank ARF for their financial support in providing keypunch service to enter data as well. We also thank Raul Rodriguez of CDFG, Larry Hreha of ODFW, Brian Culver of WDF, Russ Porter of the Pacific States Marine Fisheries Commission, the NMFS laboratory in Honolulu, and members of their staffs for distributing logbooks and collecting albacore fishing information during the fishing seasons.

Norman Bartoo, Atilio Coan Jr., and Gary Sakagawa received drafts of this report and provided useful comments. Ken Raymond/ Roy Allen/Henry Orr illustrated the maps, and Karen Handschuh prepared figures and typed the final draft of the manuscript.

Table 1. Sampling results of the U.S. North Pacific albacore fishery by gear for 1991 and 1992.

Gear-type	Effort (days)	Catch (number)	No. of Fish Measured
<u>1991</u>			
Bait	2	185	0
Jig	2,353	191,831	22,857
Bait & Jig	42*	5,439*	1,087
Gillnet	0	0	181
TOTAL	2,397	197,455	24,125
<u>1992</u>			
Bait	0	0	0
Jig	4,120	380,537	40,283
Bait & Jig	52	9,778	1,008
Gillnet	8	19	16
TOTAL	4,180	390,334	41,307

* No catch/effort data were obtained from gillnet vessels, even though some gillnet-caught fish were measured.

Table 2. Landings distribution for the U.S. North Pacific albacore troll fishery by state for 1991 and 1992.

State Where Fish Landed	Landings (mt)			Number of Landings	
	Total	Sampled	Coverage	Total	Sampled

<u>1991</u>					
Catch-and-Effort:					
California	861.8	499.3	58%	357	84
Oregon	556.1	368.6	66%	105	49
Washington	427.0	279.6	65%	55	57
TOTAL	1,844.9	1,147.5	62%	517	190

Length-Frequency:					
California	861.8	575.7	67%	357	76
Oregon	556.1	225.6	41%	105	26
Washington	427.0	322.5	76%	55	24
TOTAL	1,844.9	1,123.8	61%	517	126

<u>1992</u>					
Catch-and-Effort:					
California	953.8	481.5	50%	278	52
Oregon	1,760.5	611.0	35%	731	140
Washington	1,857.3	622.6	34%	431	93
TOTAL	4,571.6	1,715.1	38%	1,440	285

Length-Frequency:					
California	953.8	456.5	48%	278	45
Oregon	1,760.5	424.8	24%	731	60
Washington	1,857.3	1,018.7	55%	431	169
TOTAL	4,571.6	1,900.0	42%	1,440	274

Table 3. Catches of north Pacific albacore in metric tons by fisheries, 1953-1992.

YEAR	JAPAN ¹				TAIWAN ⁴		KOREA ²		UNITED STATES ³					CANADA			
	BAIT	LONG LINE	GILL NET	PURSE SEINE	OTHER GEAR	TOTAL	LONG LINE	GILL NET	BAIT	JIG	SPORT	GILL NET	PURSE SEINE	OTHER	TOTAL	TROLL	GRAND TOTAL
1953	32,921	27,777		38	132	60,868				15,740	171				15,911	5	76,784
1954	28,069	20,958		23	38	49,088				12,246	147				12,393		61,481
1955	24,236	16,277		8	136	40,657				13,264	577				13,841		54,498
1956	42,810	14,341			57	57,208				18,751	482				19,233	17	76,458
1957	49,500	21,053		83	151	70,787				21,165	304				21,469	8	92,264
1958	22,175	18,432		8	124	40,739				14,855	48				14,903	74	55,716
1959	14,252	15,802			67	30,121				20,990	0			5	20,995	212	51,328
1960	25,156	17,369			76	42,601				20,100	557			4	20,661	5	63,267
1961	18,636	17,437		7	268	36,348			2,837	12,055	1,355			6	16,253	4	52,605
1962	8,729	15,764		53	191	24,737			1,085	19,752	1,681			8	22,526	1	47,264
1963	26,420	13,464		59	218	40,161			2,432	25,140	1,161			7	28,740	5	68,906
1964	23,858	15,458		128	319	39,763			3,411	18,388	824			4	22,627	3	62,419
1965	41,491	13,701		11	121	55,324	26		417	16,542	731			3	17,693	15	73,293
1966	22,830	25,050		111	585	48,576	261		1,600	15,333	588			9	17,530	44	66,421
1967	30,481	28,869		89	520	59,959	271		4,113	17,814	707			12	22,646	161	83,071
1968	16,597	23,961		267	1,109	41,934	305		4,906	20,434	951			10	26,301	1,028	69,745
1969	32,107	18,006		521	1,480	52,114	569		2,996	18,827	358			12	22,193	1,365	76,241
1970	24,376	15,372		317	794	40,859	1,482		4,416	21,032	822			9	26,279	354	69,974
1971	53,198	11,035		902	367	65,502	1,739		2,071	20,526	1,175			11	23,783	1,587	92,611
1972	60,762	12,649		277	646	74,335	2,904		3,750	23,600	637			8	27,995	3,558	108,792
1973	69,811	16,059		1,353	533	87,795	128		2,236	15,653	84			14	17,987	1,270	107,180
1974	73,576	13,053		224	959	87,973	84		4,777	20,178	94			9	25,058	1,207	114,322
1975	52,157	10,060		166	254	62,796	254	319	3,243	18,932	640			43	22,858	101	86,328
1976	85,336	15,896		1,070	285	103,696	565	971	2,700	15,905	713			27	19,345	252	124,829
1977	31,934	15,737		688	379	49,407	301	65	1,497	9,969	537			36	12,039	53	61,865
1978	59,877	13,061		4,029	2,097	80,179	278	174	950	16,613	810			69	18,442	23	99,096
1979	44,662	14,249		2,856	1,158	63,050	106	27	303	6,781	74			(31)	7,189	521	70,893
1980	46,743	14,743		2,986	329	66,010	39	15	382	7,556	168			(24)	8,130	212	74,406
1981	27,426	18,020		10,348	904	56,950	163	600	748	12,637	195			(60)	13,640	200	71,553
1982	29,615	16,762		12,511	732	60,181	521	1,070	425	6,609	257			(84)	7,375	104	69,251
1983	21,098	15,103		6,852	350	43,528	512	1,233	607	9,359	87			(213)	10,266	225	55,764
1984	26,015	15,111		8,988	518	54,012	471	1,041	1,030	9,304	1,427			(138)	15,627	50	71,201
1985	20,714	14,320		11,204	407	48,178	109	2,169	1,498	6,415	1,176			(83)	9,174	56	59,686
1986	16,096	12,945		7,813	650	39,046			432	4,708	196			(106)	5,445	30	44,520
1987	19,091	14,642		6,698	1,205	41,825		7,700	158	2,766	74			136	3,139	104	52,768
1988	6,216	13,904		9,074	1,208	30,579	38	11,366	598	4,212	64			318	5,207	155	47,345
1989	8,629	12,899		7,437	2,521	32,907	504	4,200	54	1,860	160			272	2,350	200	40,161
1990	12,500	(13,815)		(7,736)	2,315	(596)			115	2,603	24			71	3,023	305	(40,290)
1991	7,751	(13,815)		(7,736)	3,741	(596)			0	1,828	6			0	2,163	139	(35,941)
1992	17,779	(13,815)		(7,736)	4,882	(596)			0	4,572	+			0	(4,872)	(125)	(49,358)

Provisional estimates are given in parentheses

- 1 Japanese baitboat catches include fish caught by research vessels. Longline catches for 1952-60 exclude minor amounts taken by vessels under 20 tons; catches from 1958-68 were readjusted in 1988; catches are estimated by multiplying annual number of fish caught by average weight statistics. Gillnet catches for 1983-88 include south Pacific catches and are for the directed fishery. Provisional estimates for 1990-92 are averages of landings for 1987-89.
- 2 Korean longline catches calculated from FAO statistics and Korean catch/effort data. Gillnet catches are missing.
- 3 U.S. jigboat catches for 1952-60 include fish caught by baitboats, for 1984-88 include gillnet catches. Other figures include catches of various gear types landed in Hawaii. Other figures for 1979-86 are raised from data with very low coverage rates.
- 4 Taiwanese gillnet catches are preliminary figures via personal communications from Institute of Oceanography, National Taiwan University.

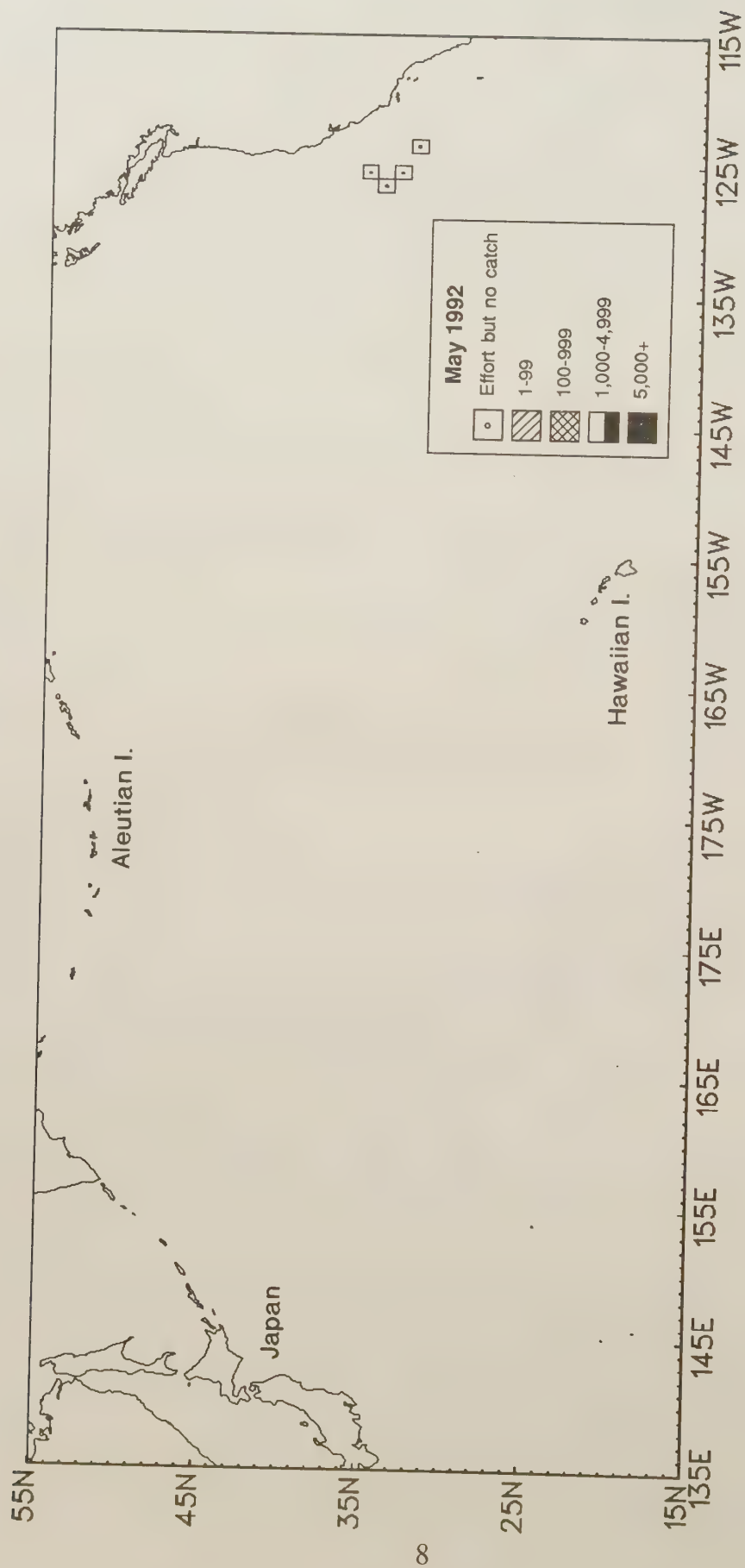


Figure 1a. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, May 1992.

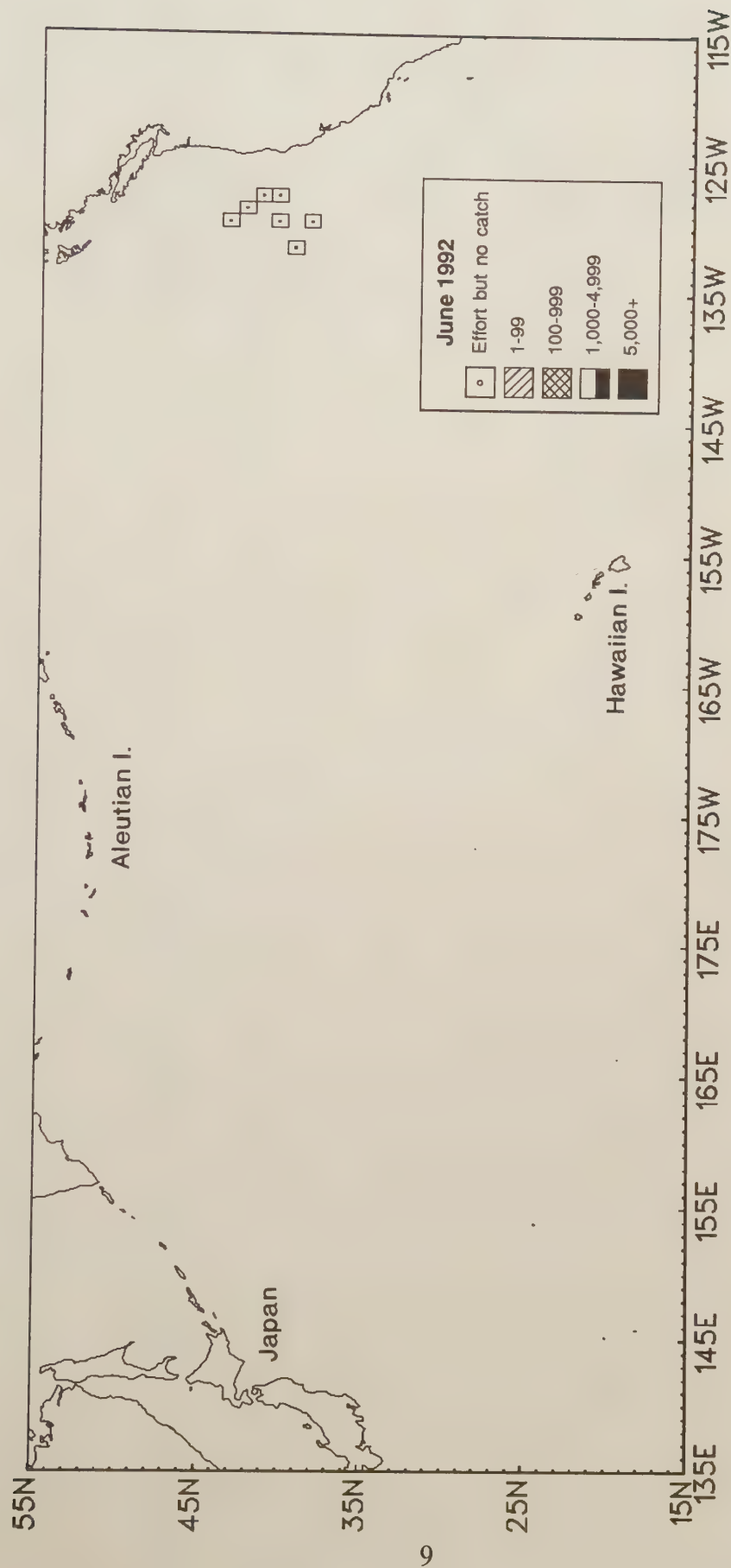


Figure 1b. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, June 1992.

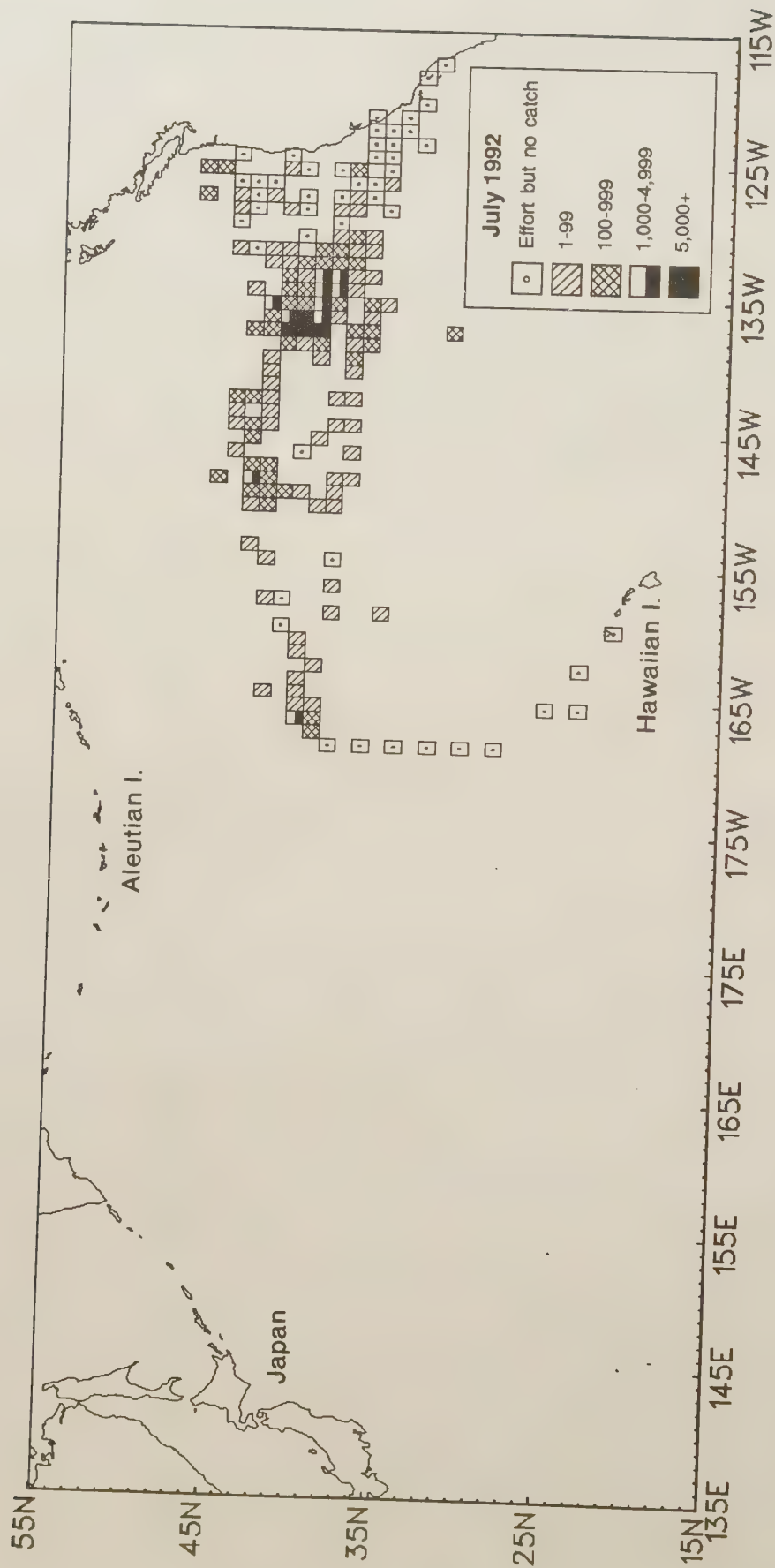


Figure 1c. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, July 1992.

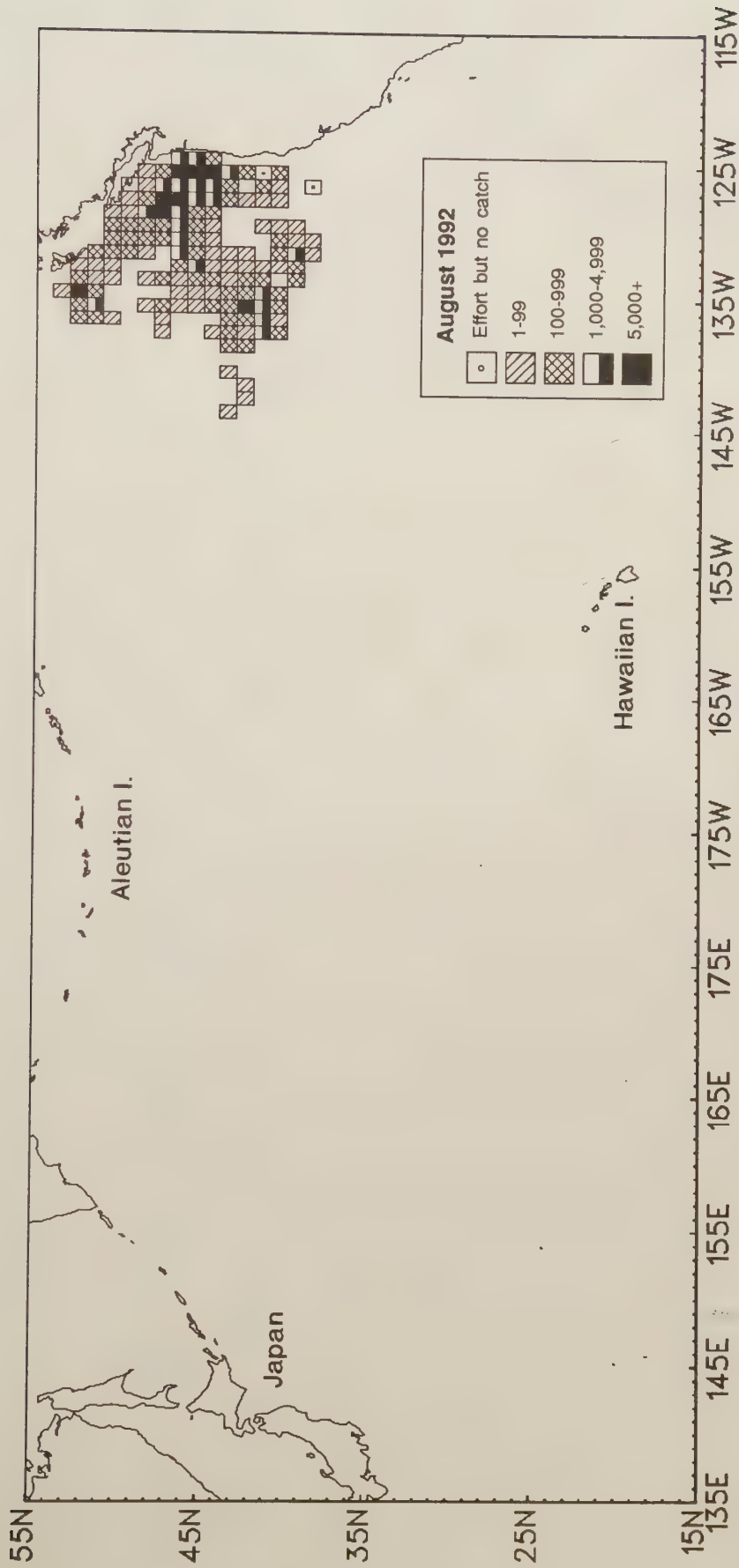


Figure 1d. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, August 1992.

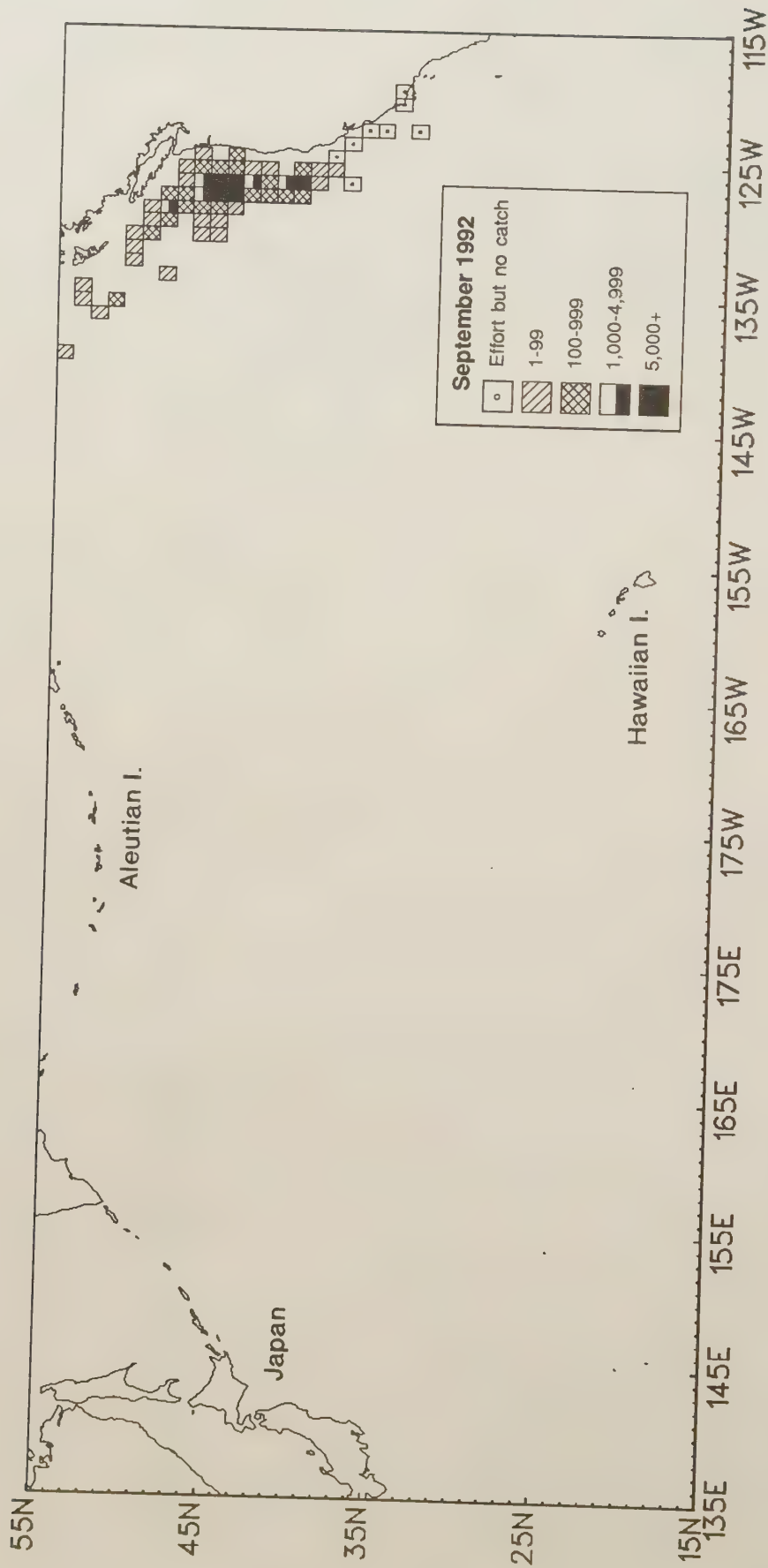


Figure 1e. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, September 1992.

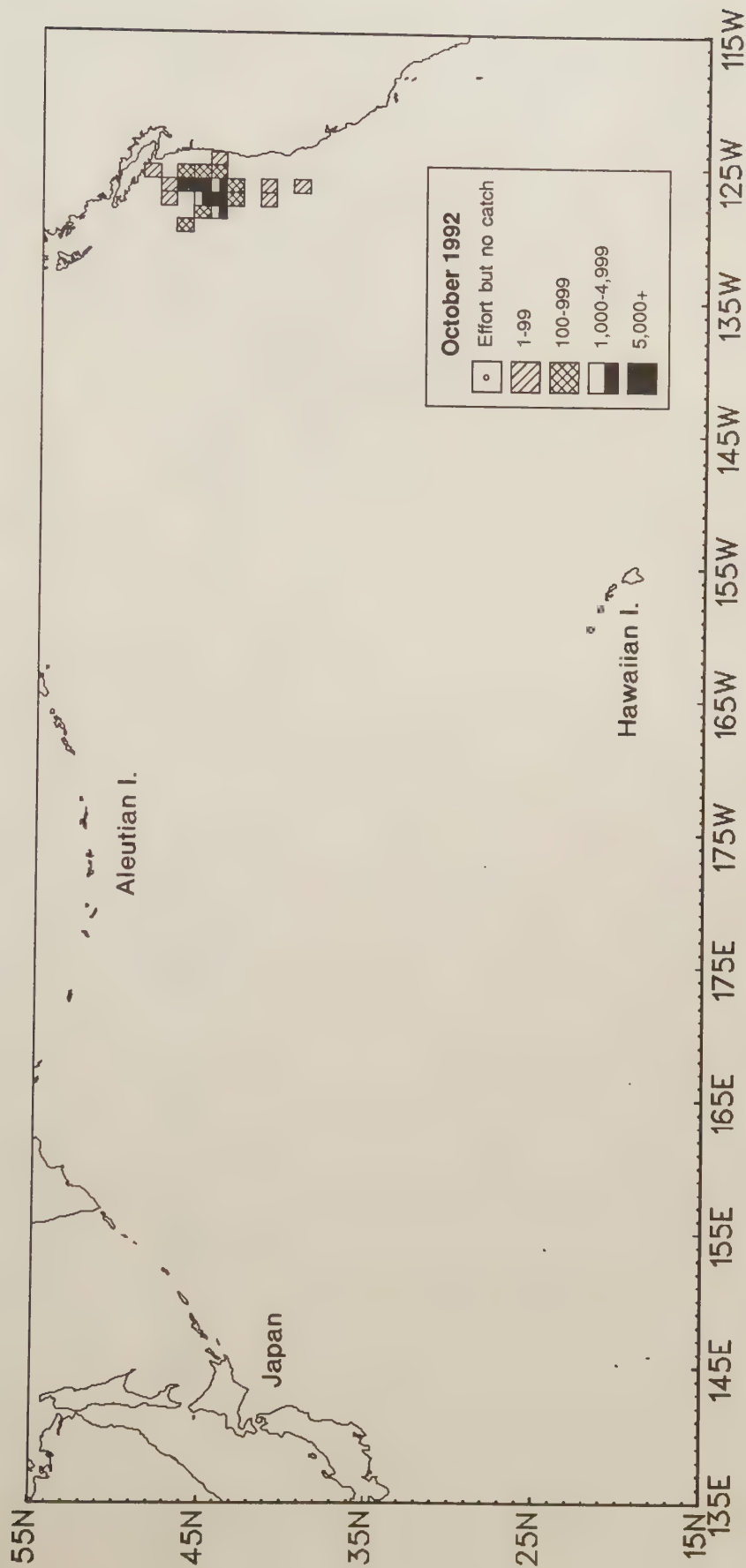


Figure 1f. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, October 1992.

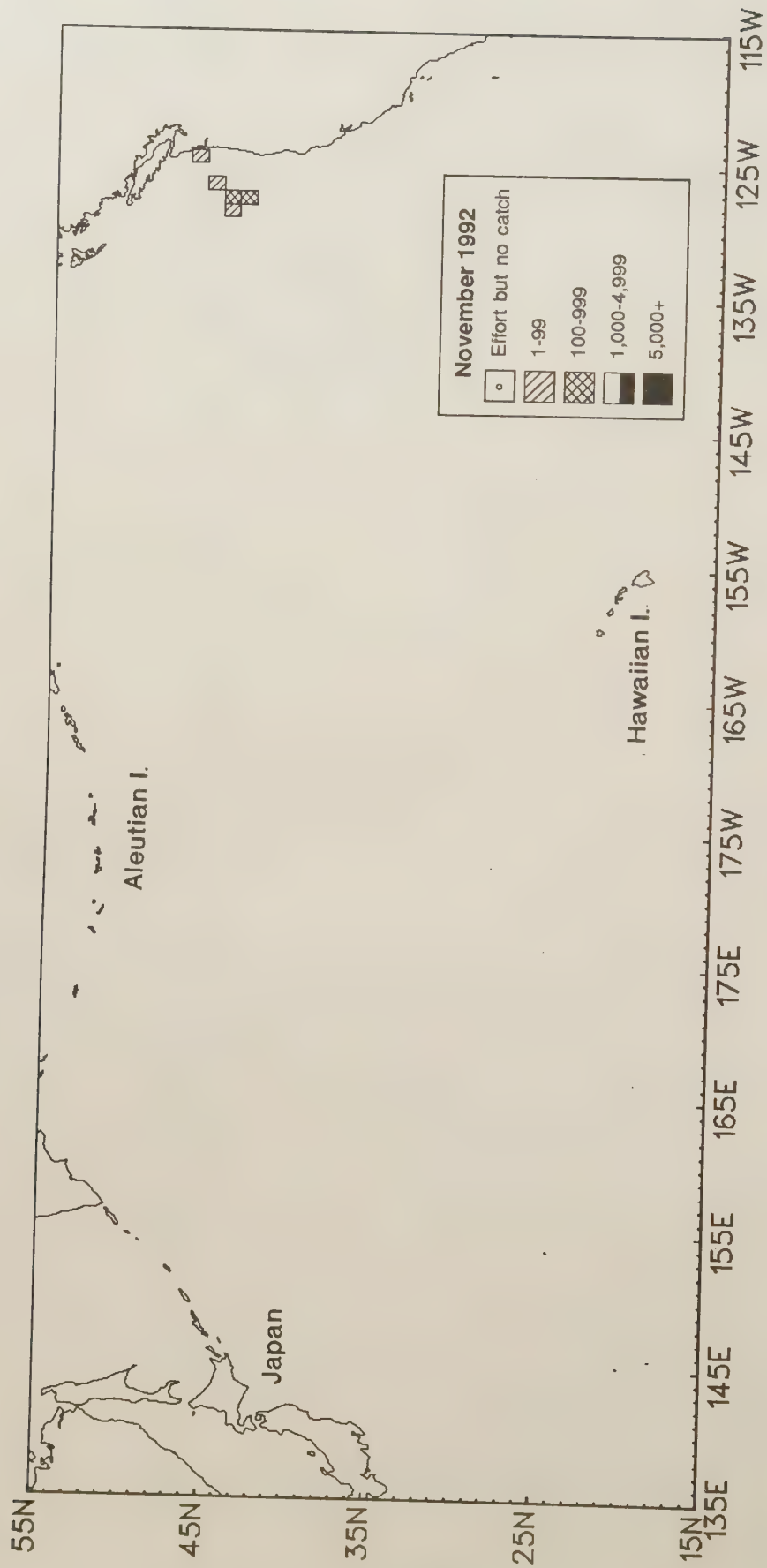


Figure 1g. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, November 1992.

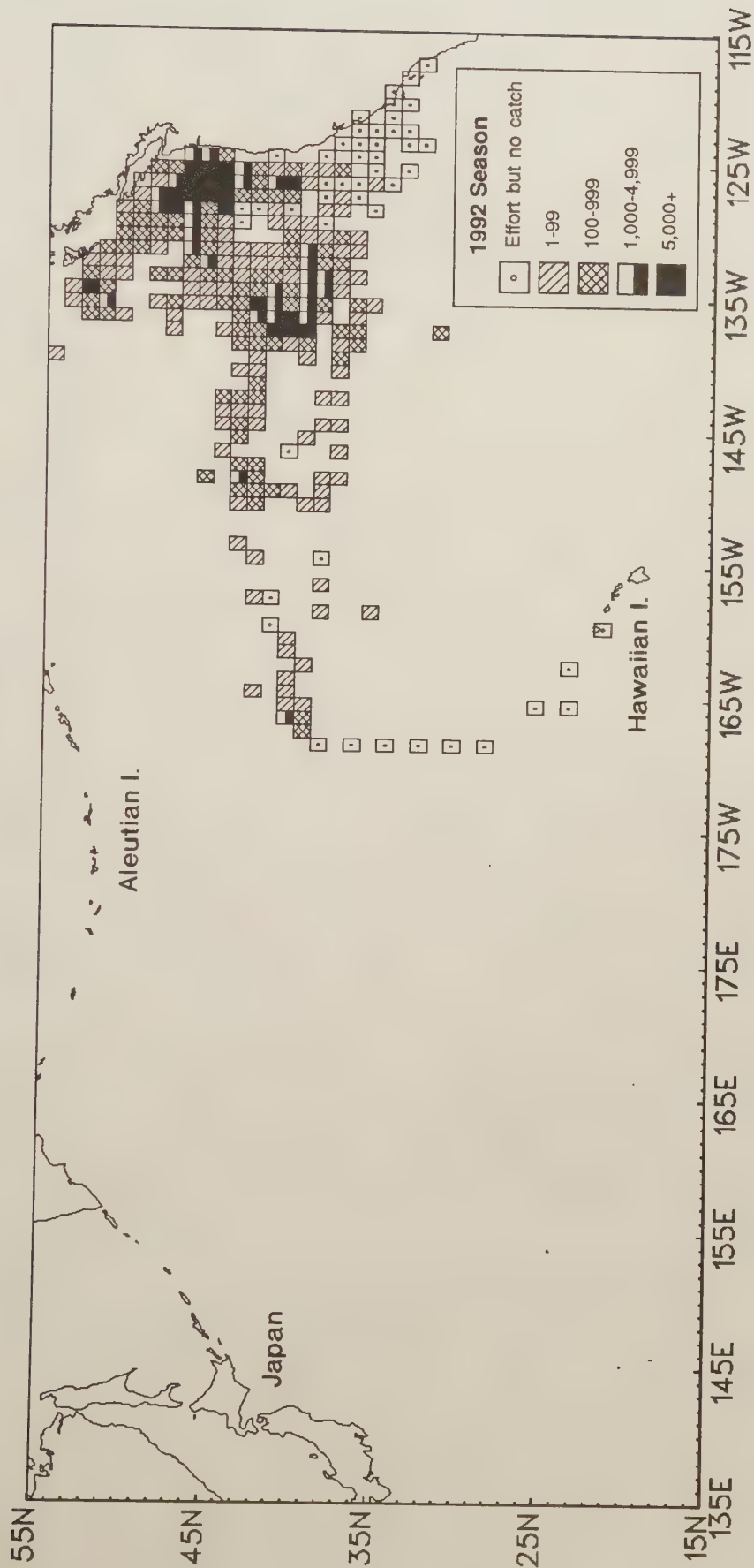


Figure 1h. U.S. albacore catch (numbers of fish) by 1° quadrangle in the north Pacific, 1992 season.

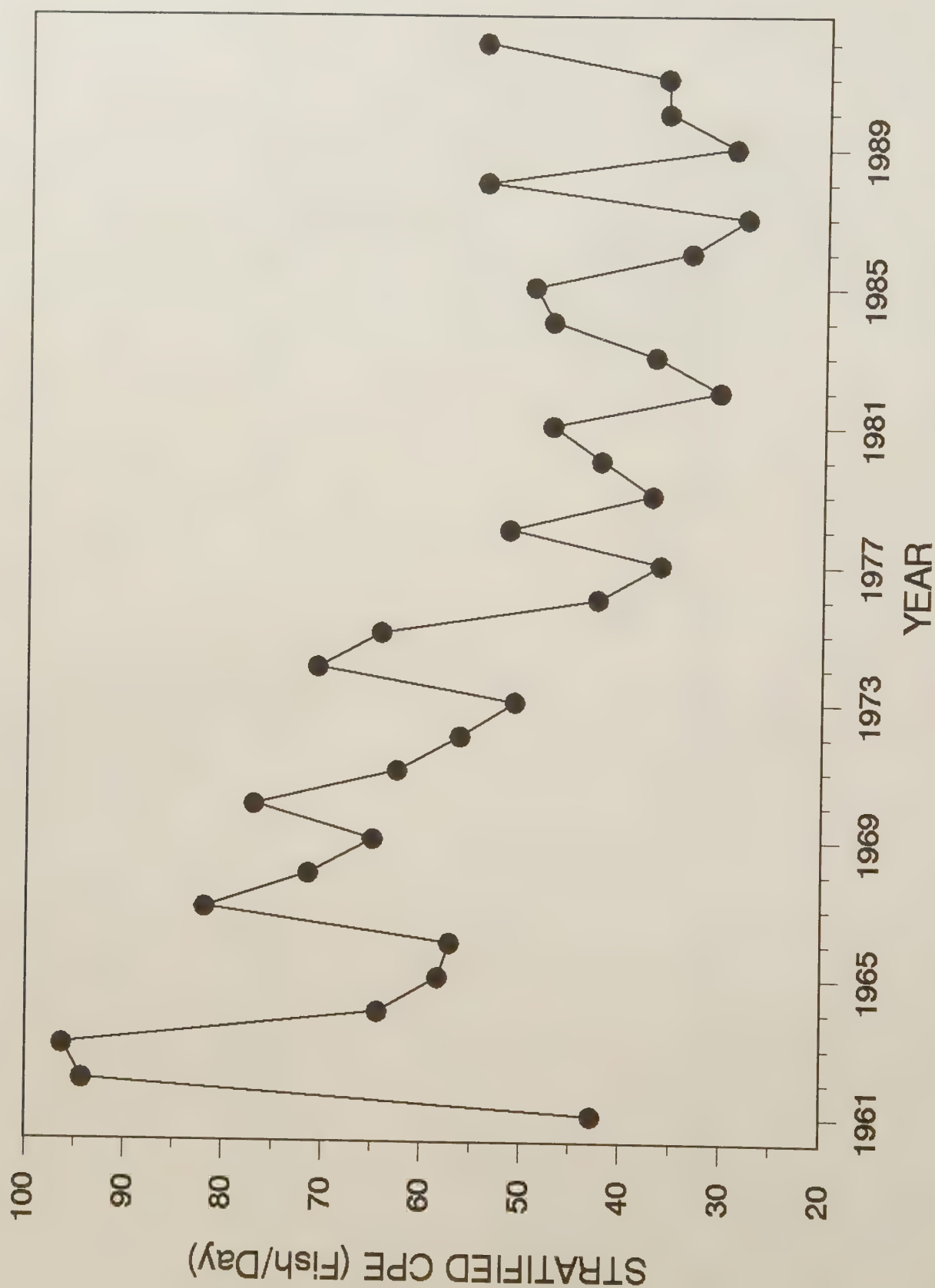


Figure 2. U.S. north Pacific albacore jigboat Catch Per Effort (fish/day) by year, 1961-1992.

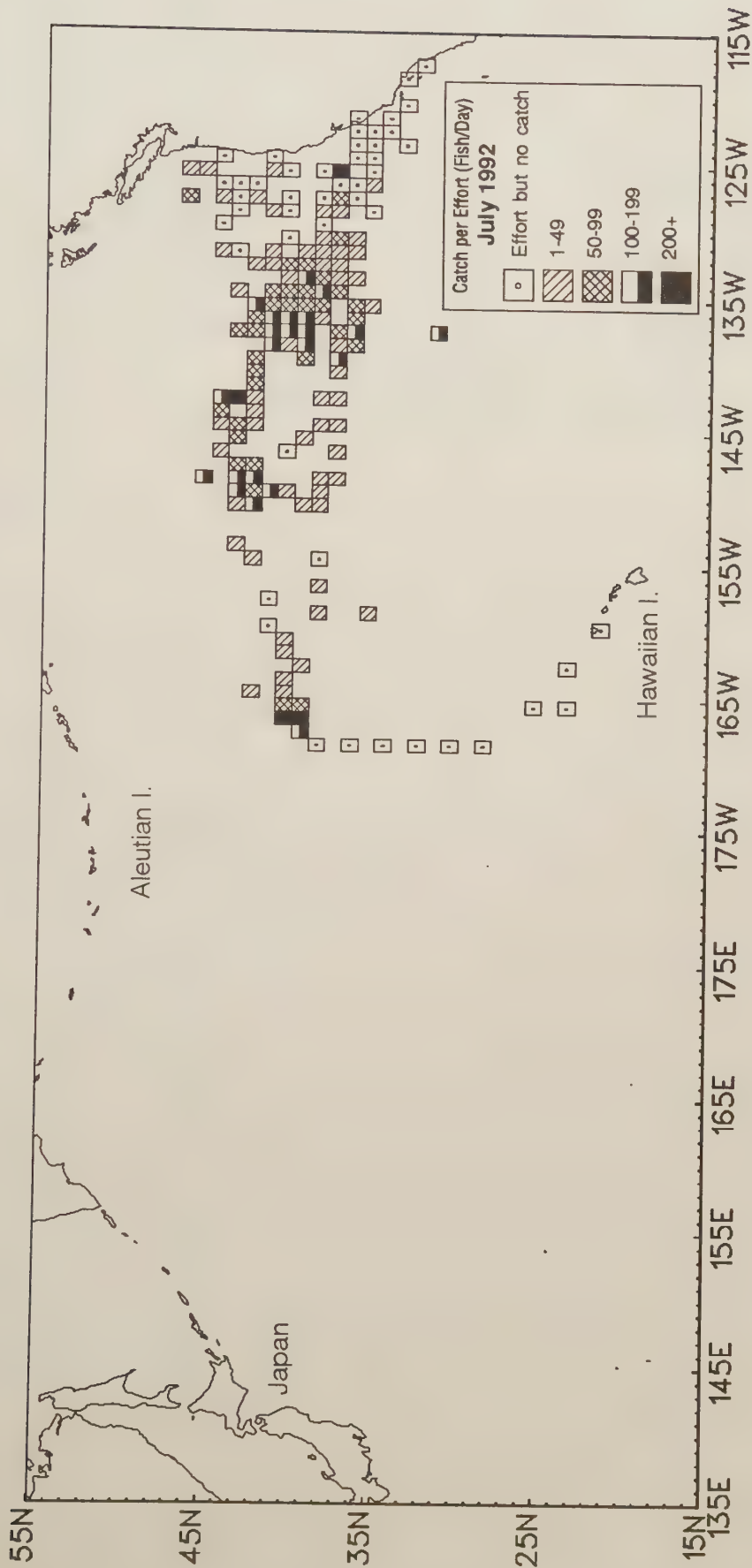


Figure 3a. U.S. albacore jigboat Catch Per Effort (fish/day) by 1° quadrangle in the north Pacific, July 1992.

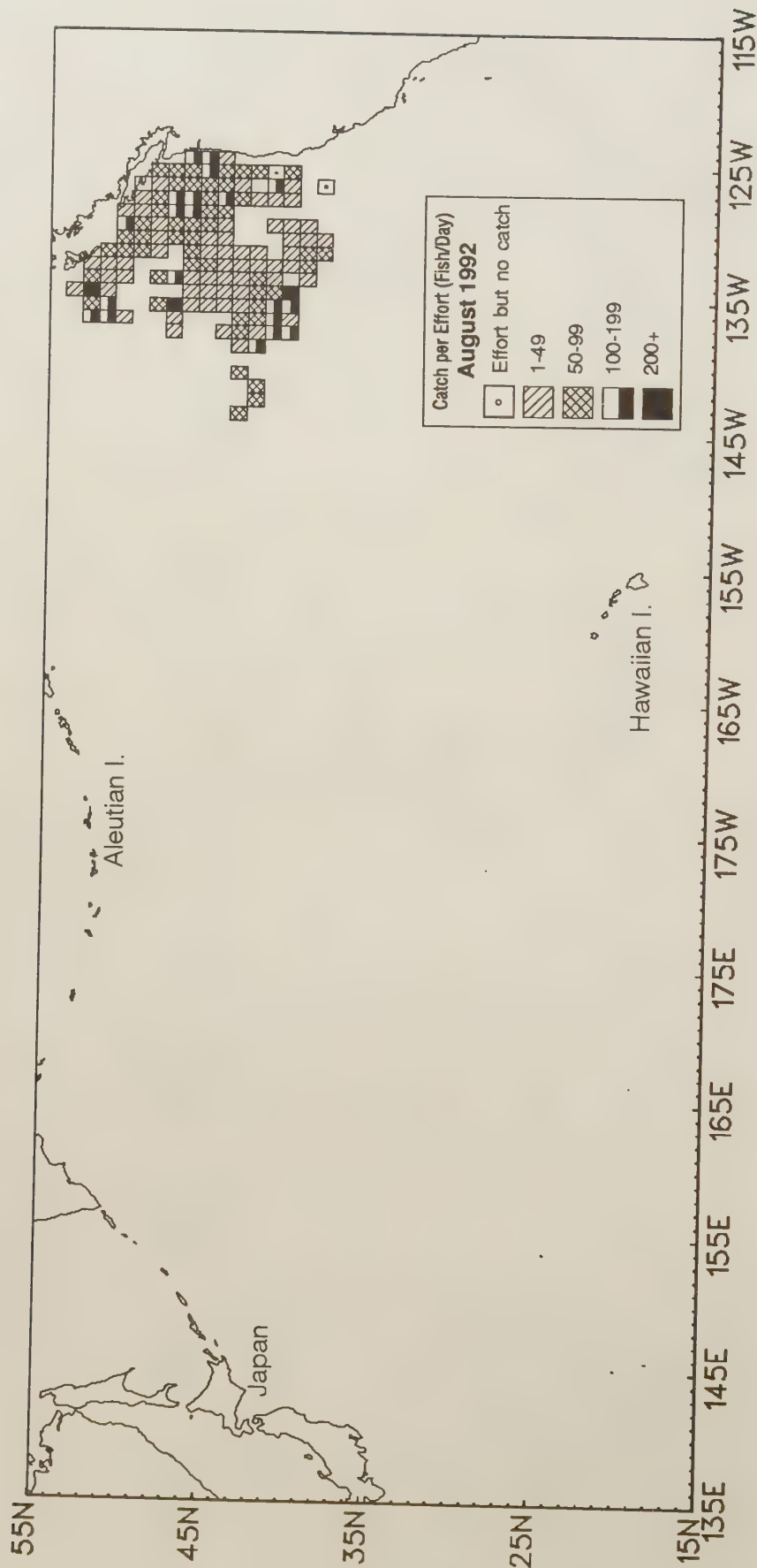


Figure 3b. U.S. albacore jigboat Catch Per Effort (fish/day) by 1° quadrangle in the north Pacific, August 1992.

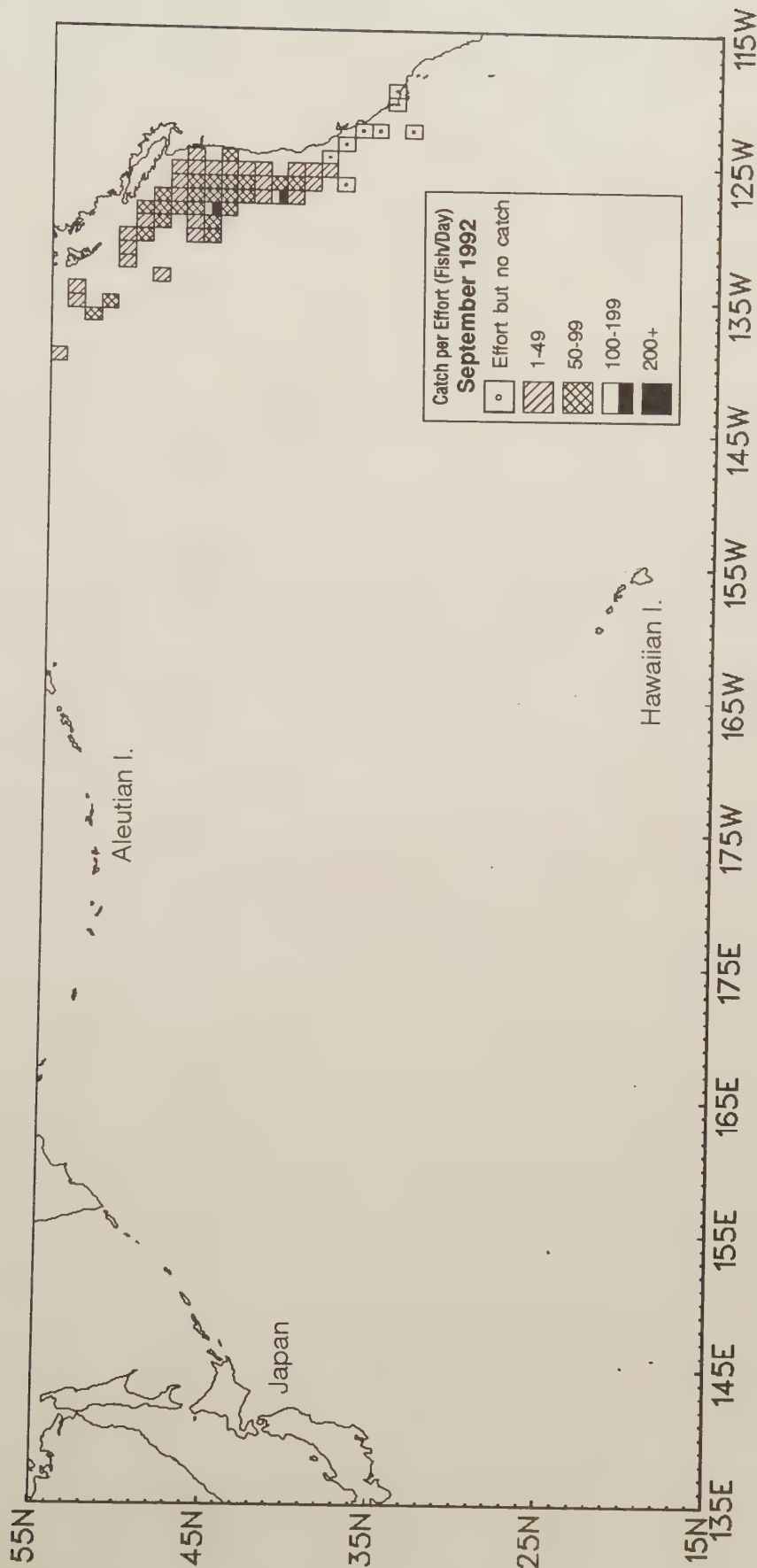


Figure 3c. U.S. albacore jigboat Catch Per Effort (fish/day) by 1° quadrangle in the north Pacific, September 1992.

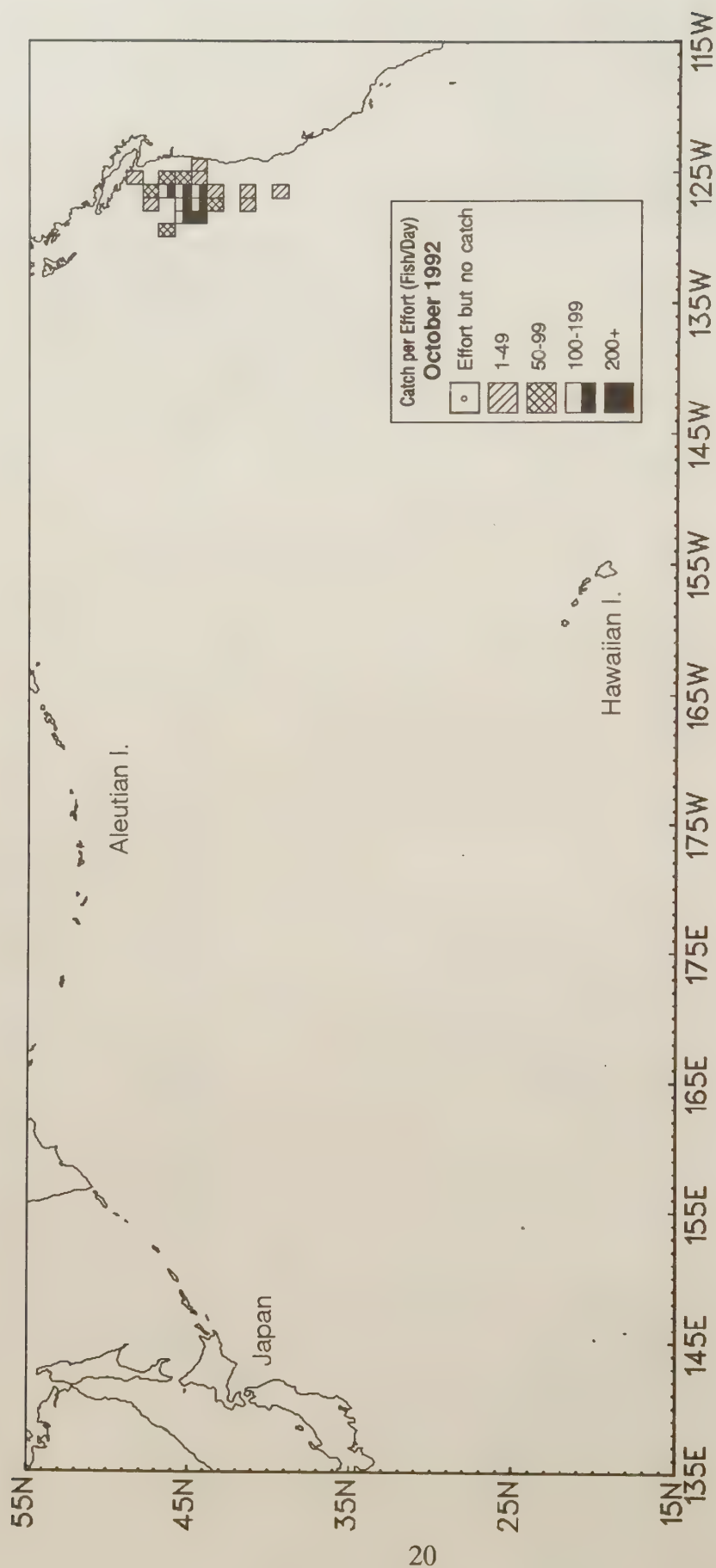


Figure 3d. U.S. albacore jigboat Catch Per Effort (fish/day) by 1° quadrangle in the north Pacific, October 1992.

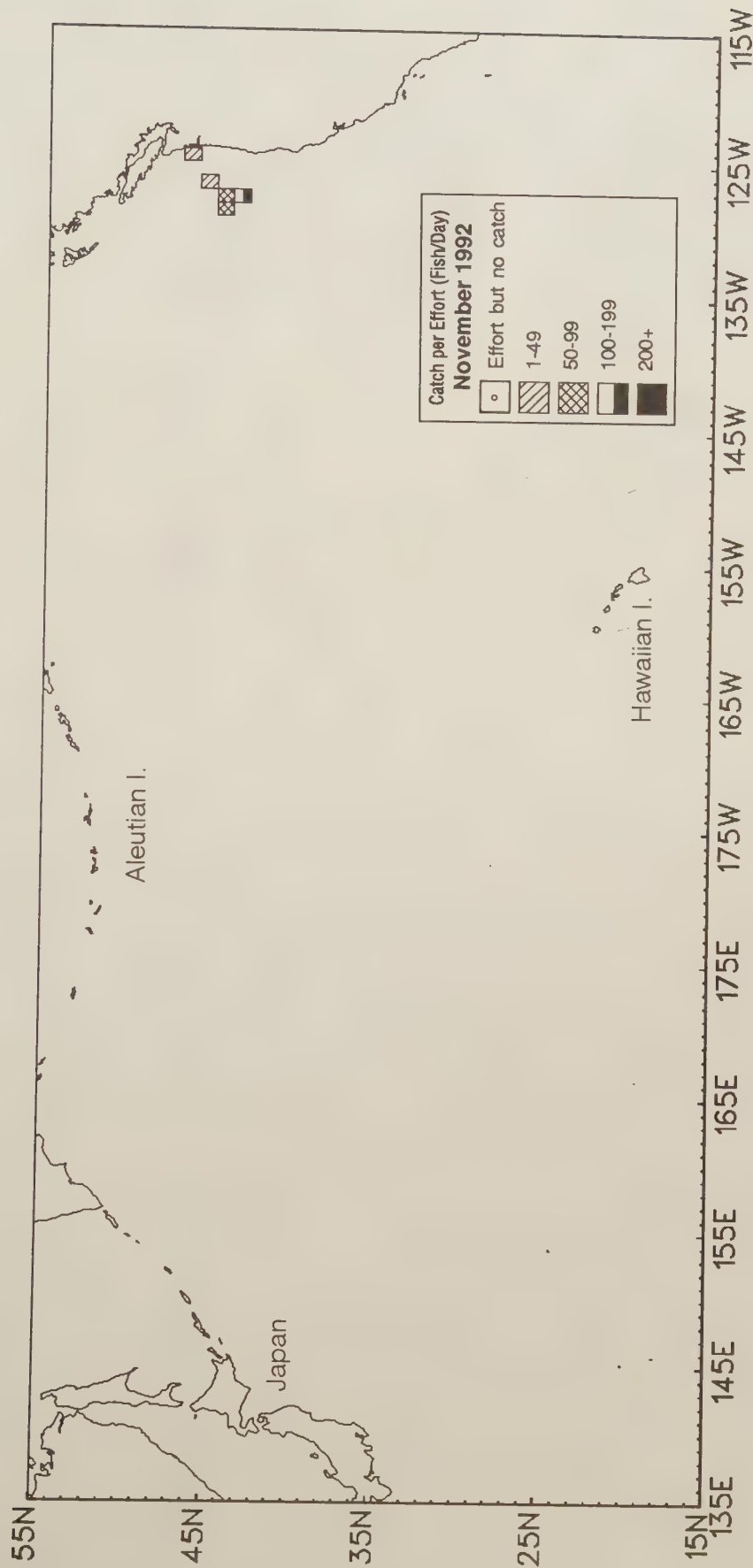


Figure 3e. U.S. albacore jigboat Catch Per Effort (fish/day) by 1° quadrangle in the north Pacific, November 1992.

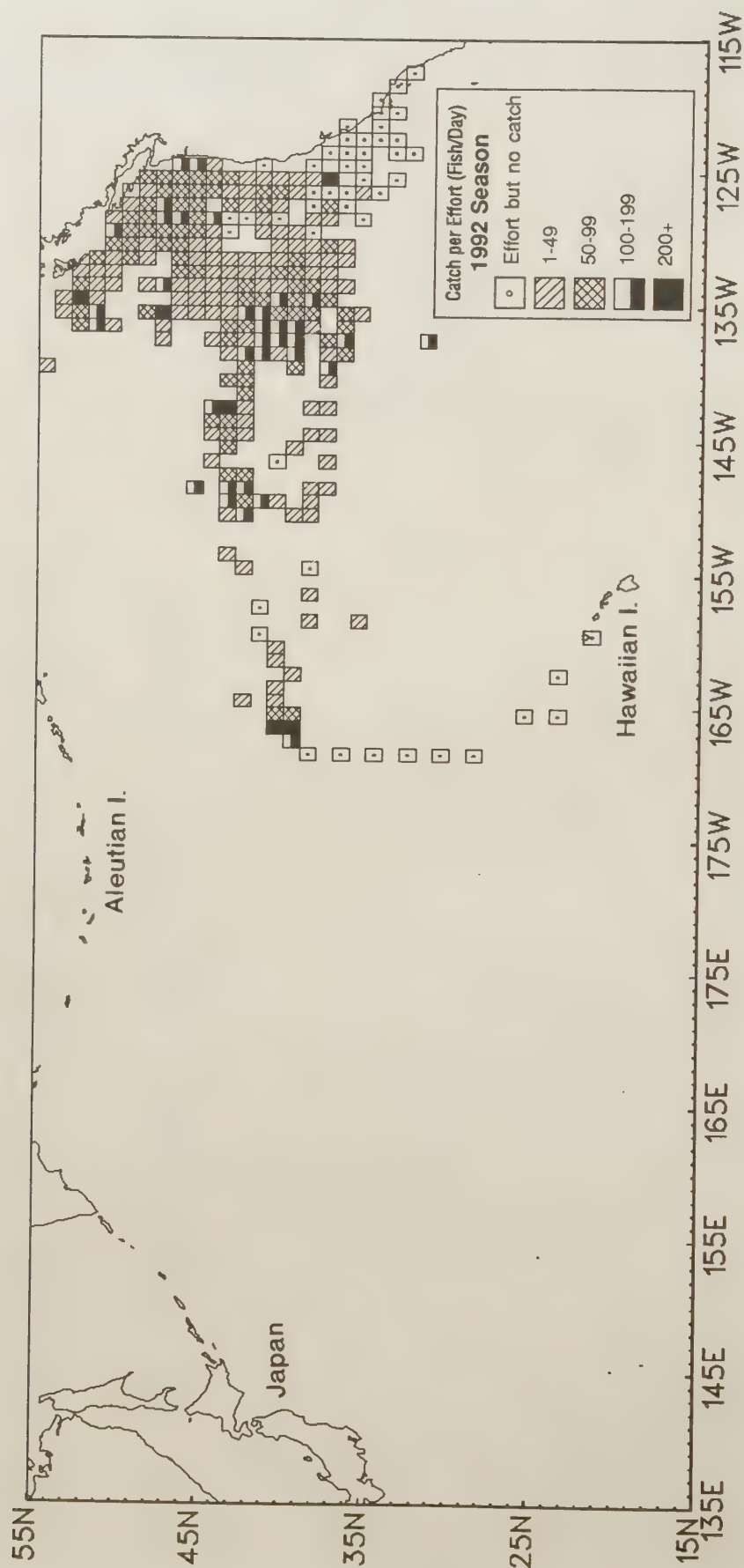


Figure 3f. U.S. albacore jigboat Catch Per Effort (fish/day) by 1° quadrangle in the north Pacific, 1992 season.

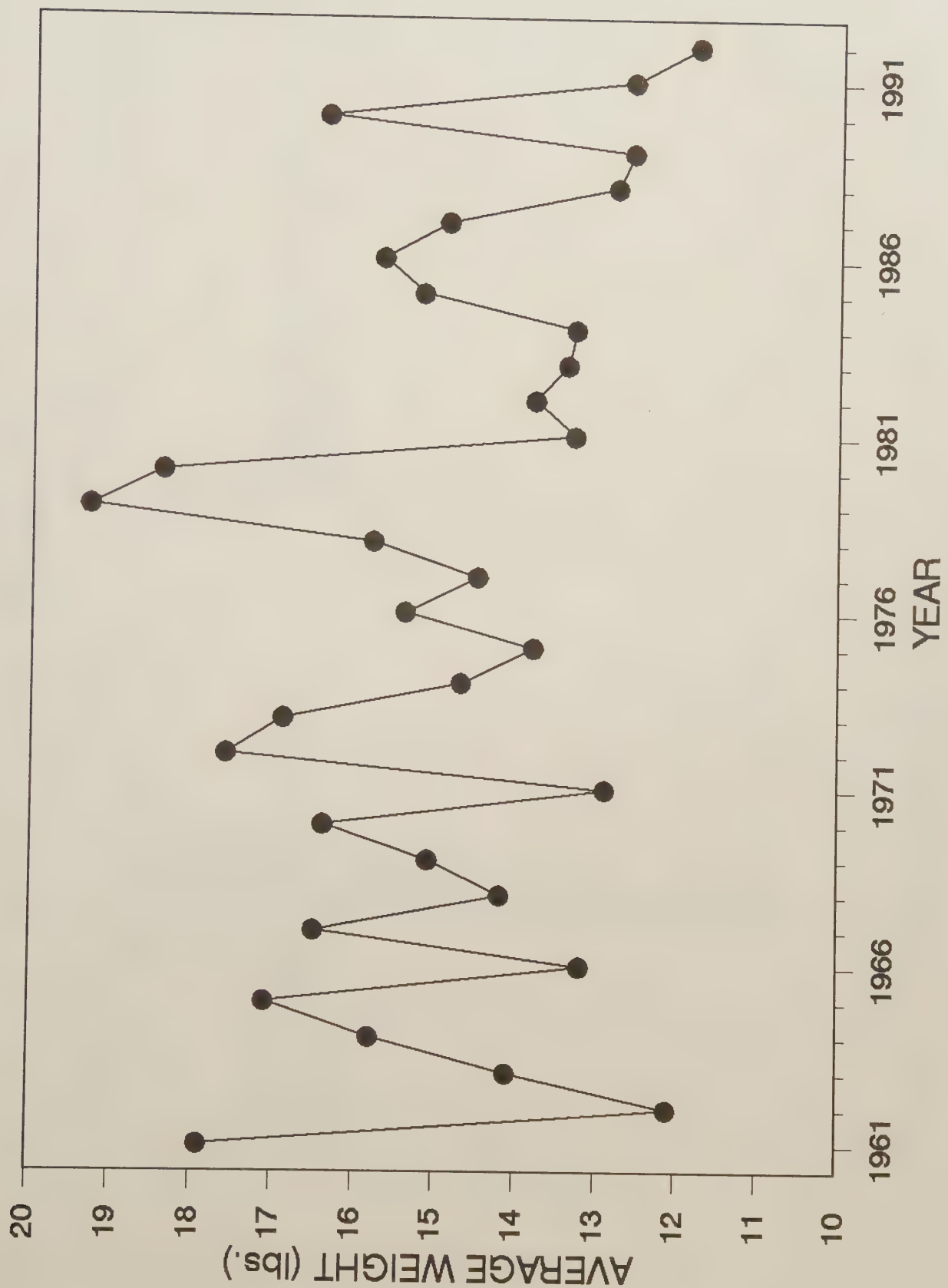


Figure 4. Average weight (lbs.) of north Pacific albacore caught by U.S. vessels by year, 1961-1992.

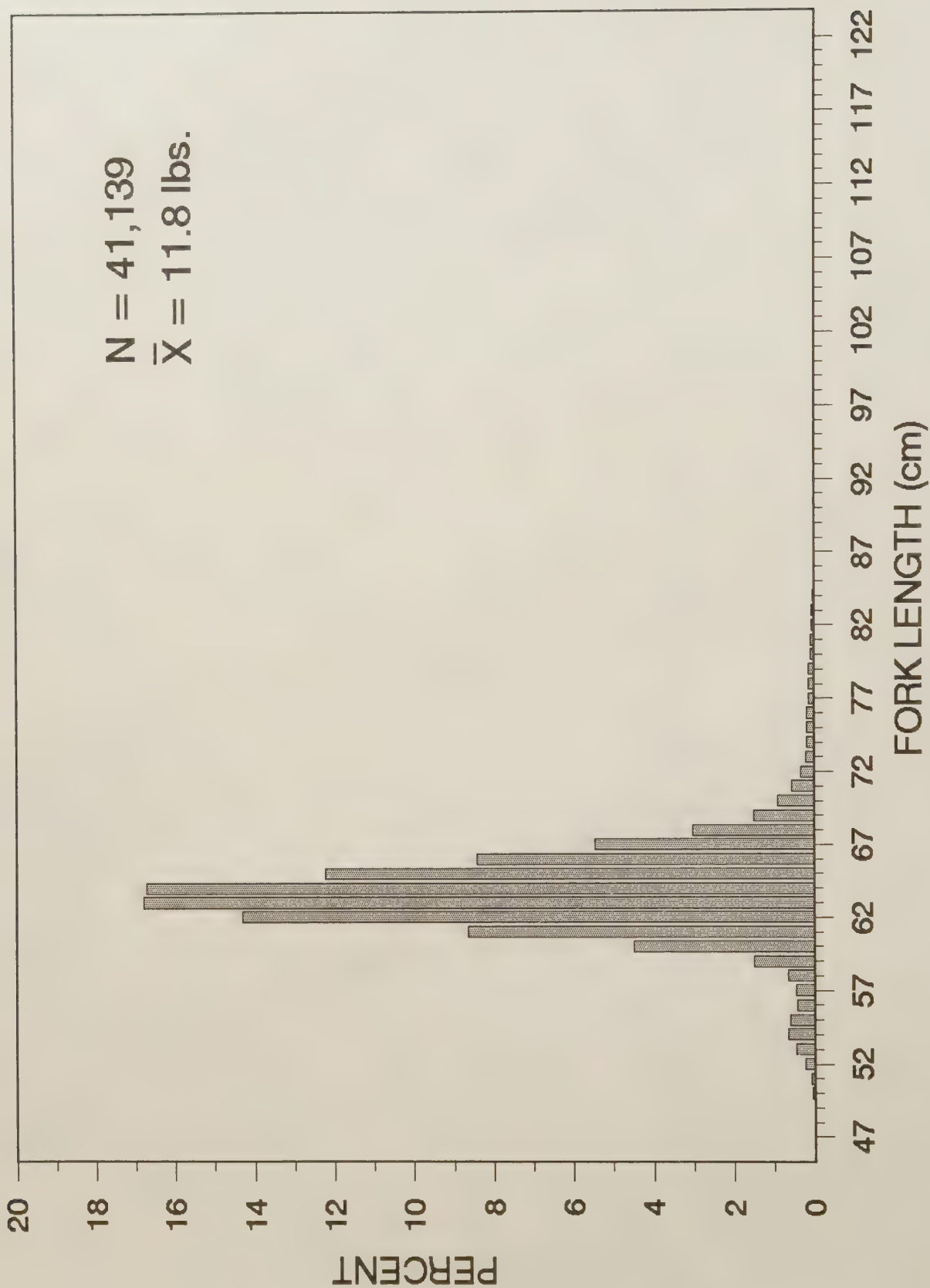


Figure 5. Length-frequency histogram of fish caught by the U.S. north Pacific albacore fleet, 1992 season.

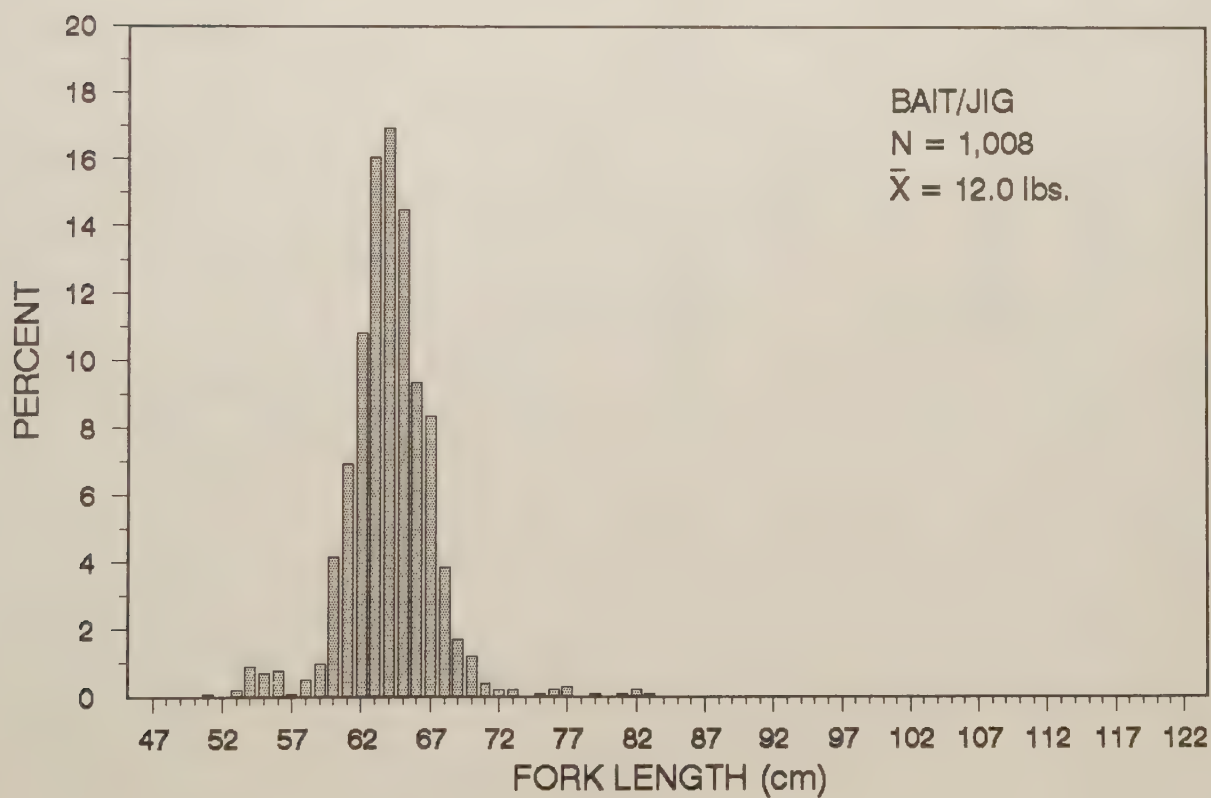
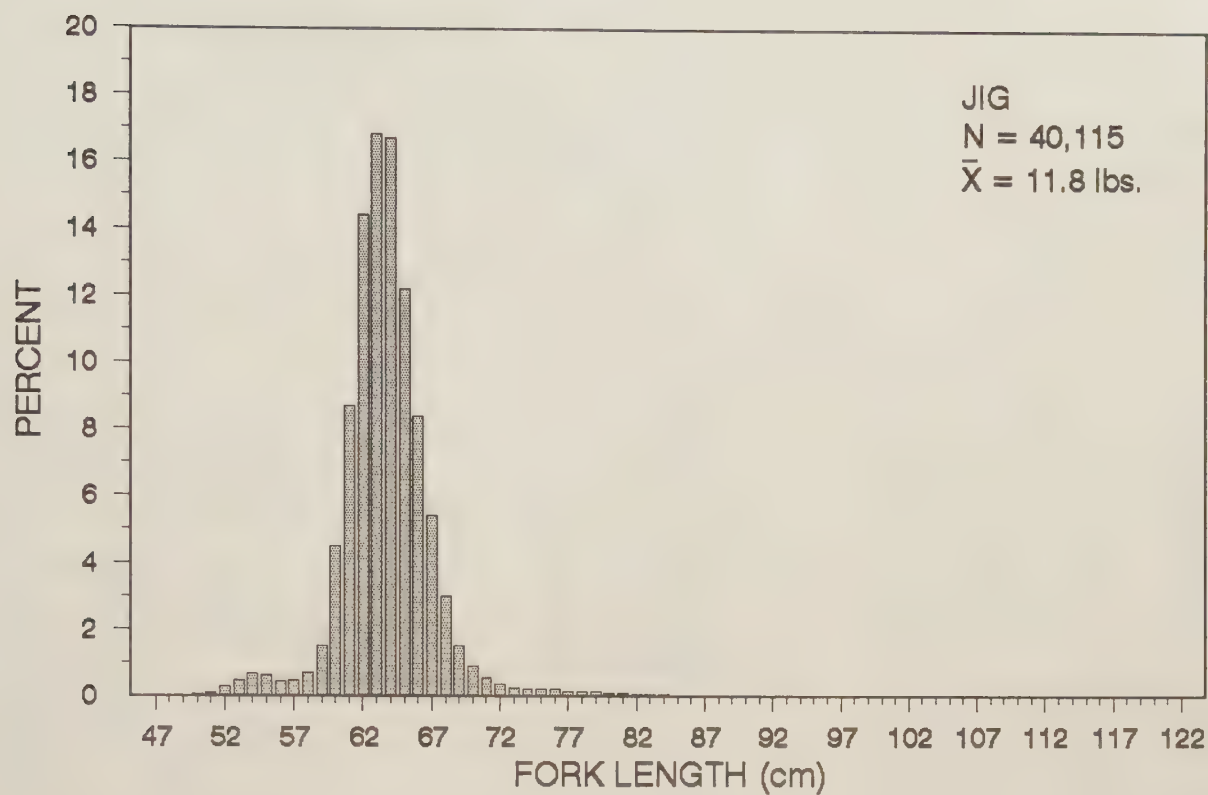


Figure 6. Length-frequency histograms of fish caught by the U.S. north Pacific albacore fleet in 1992 by gear.

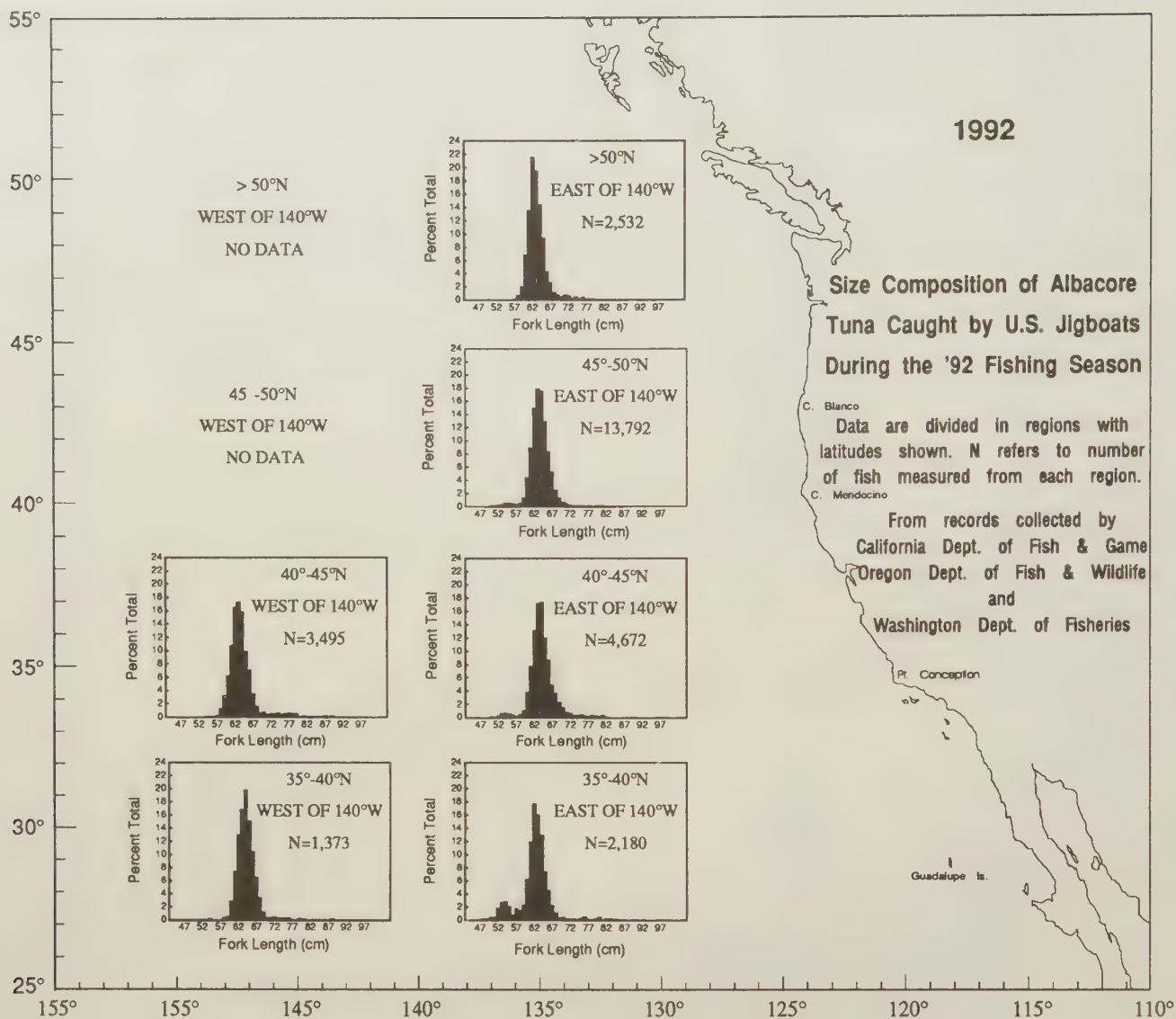


Figure 7a. Length-frequency histograms of albacore caught by U.S. vessels fishing jig in the north Pacific, 1992 season.

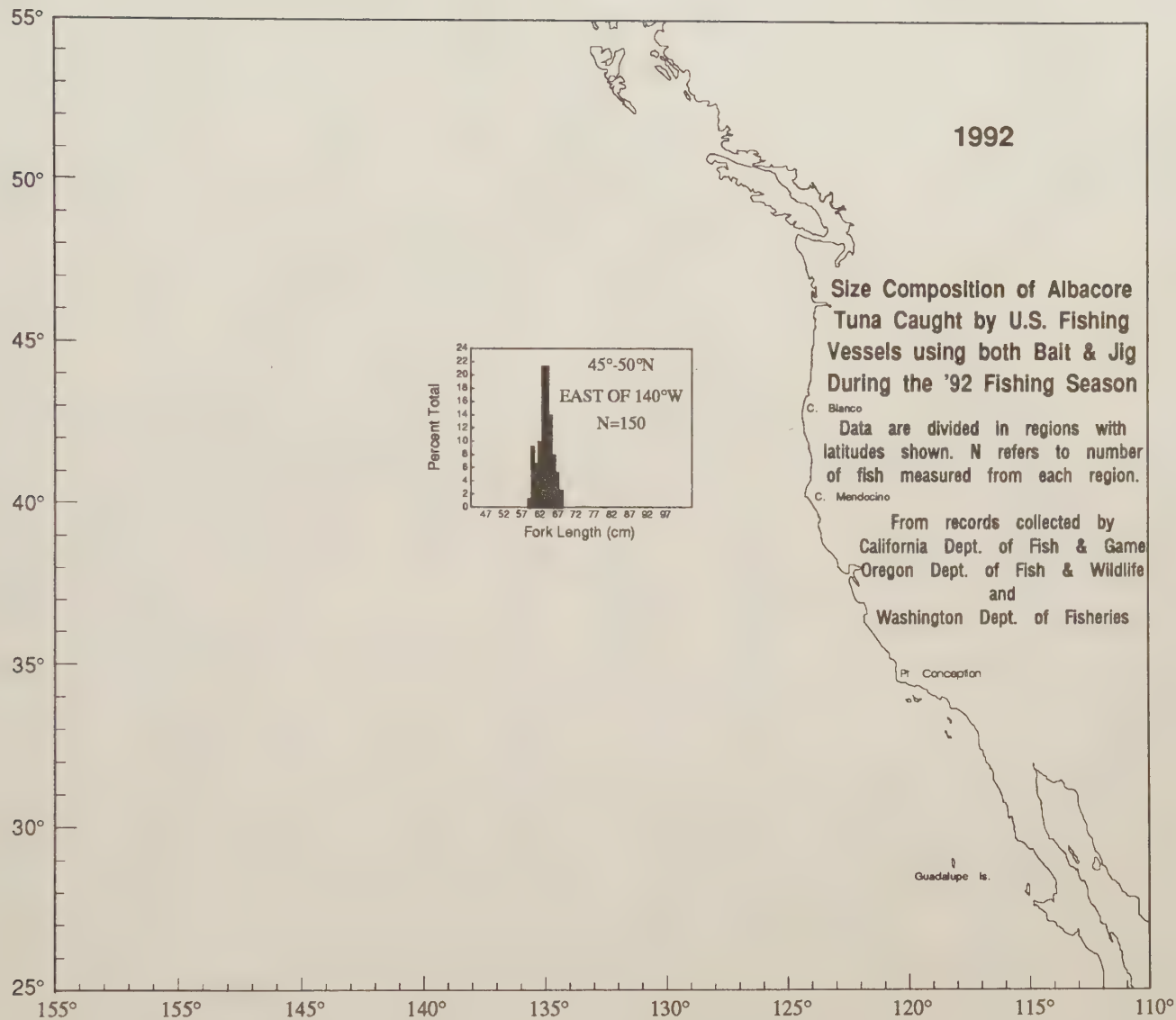


Figure 7b. Length-frequency histograms of albacore caught by U.S. vessels fishing bait and jig in the north Pacific, 1992 season.

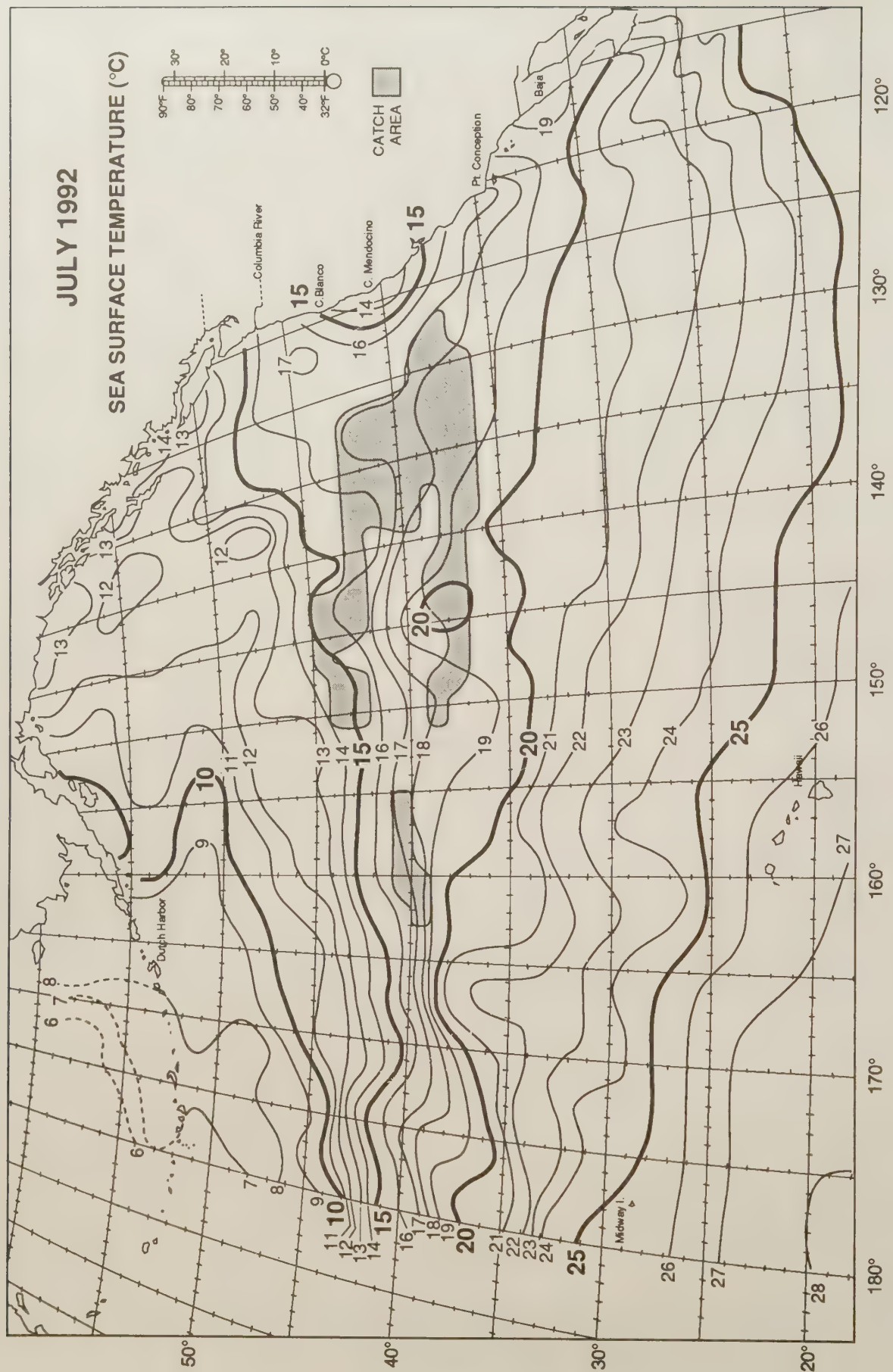


Figure 8a. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, July 1992.

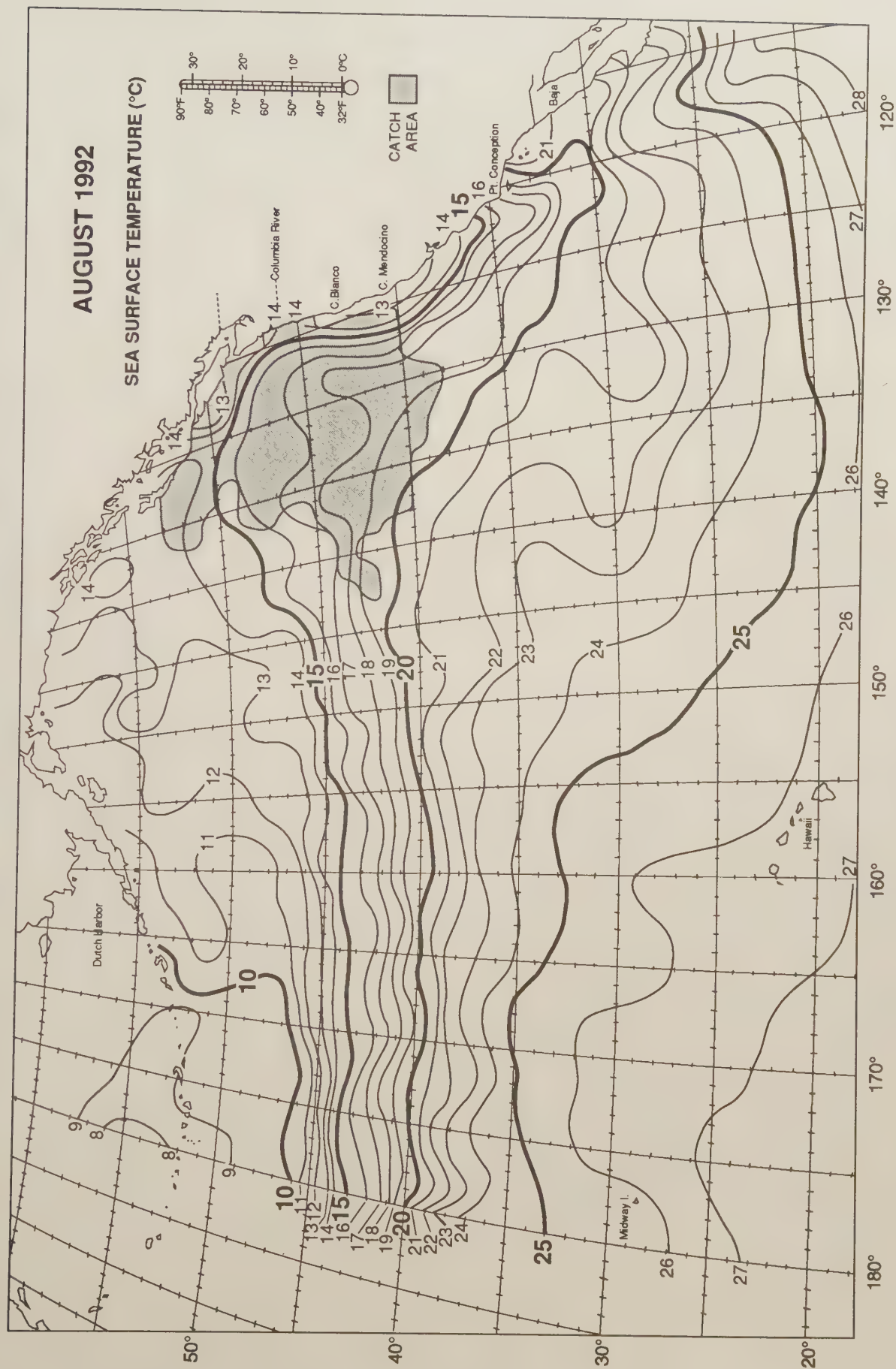


Figure 8b. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, August 1992.

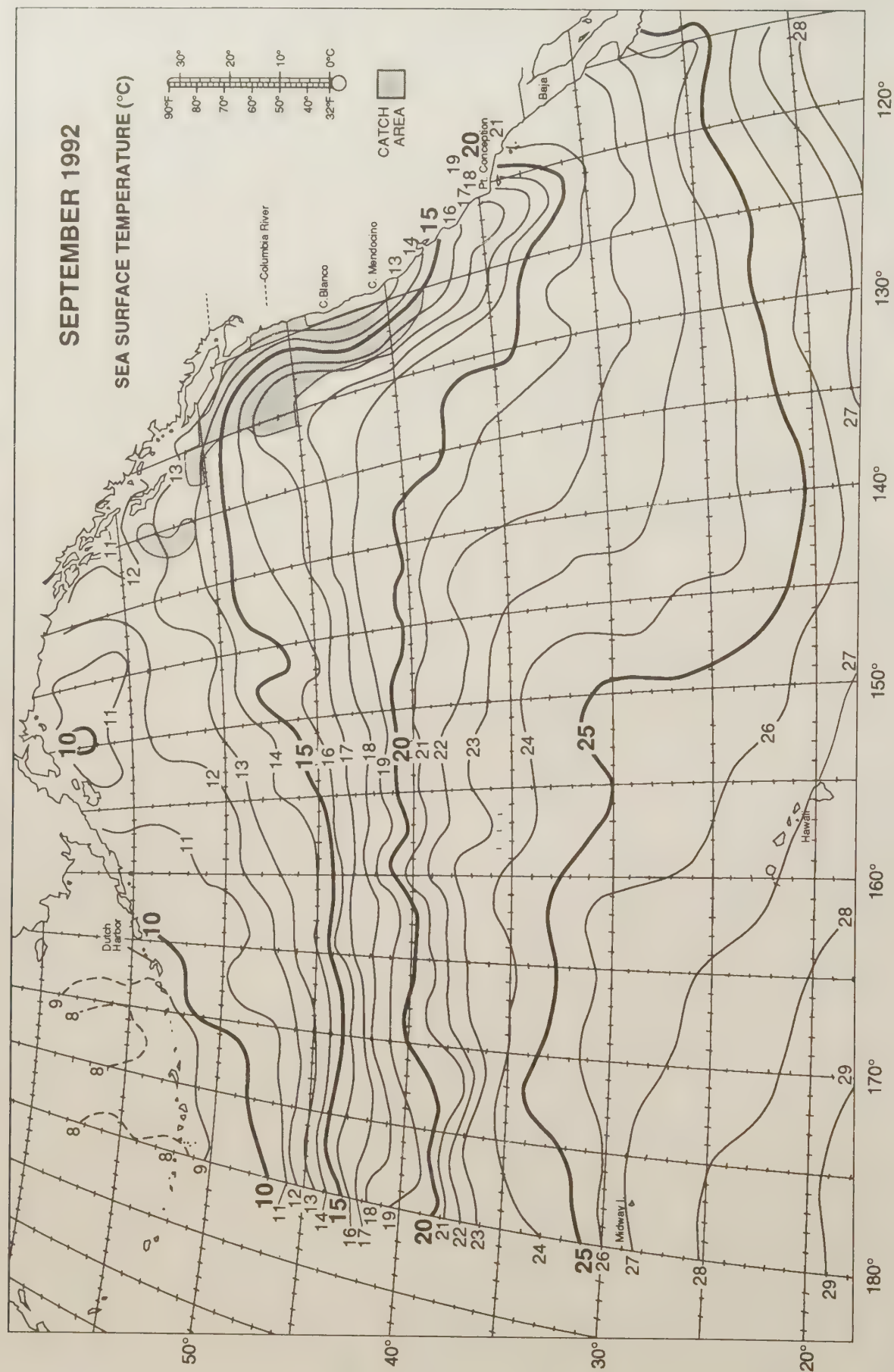


Figure 8c. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, September 1992.

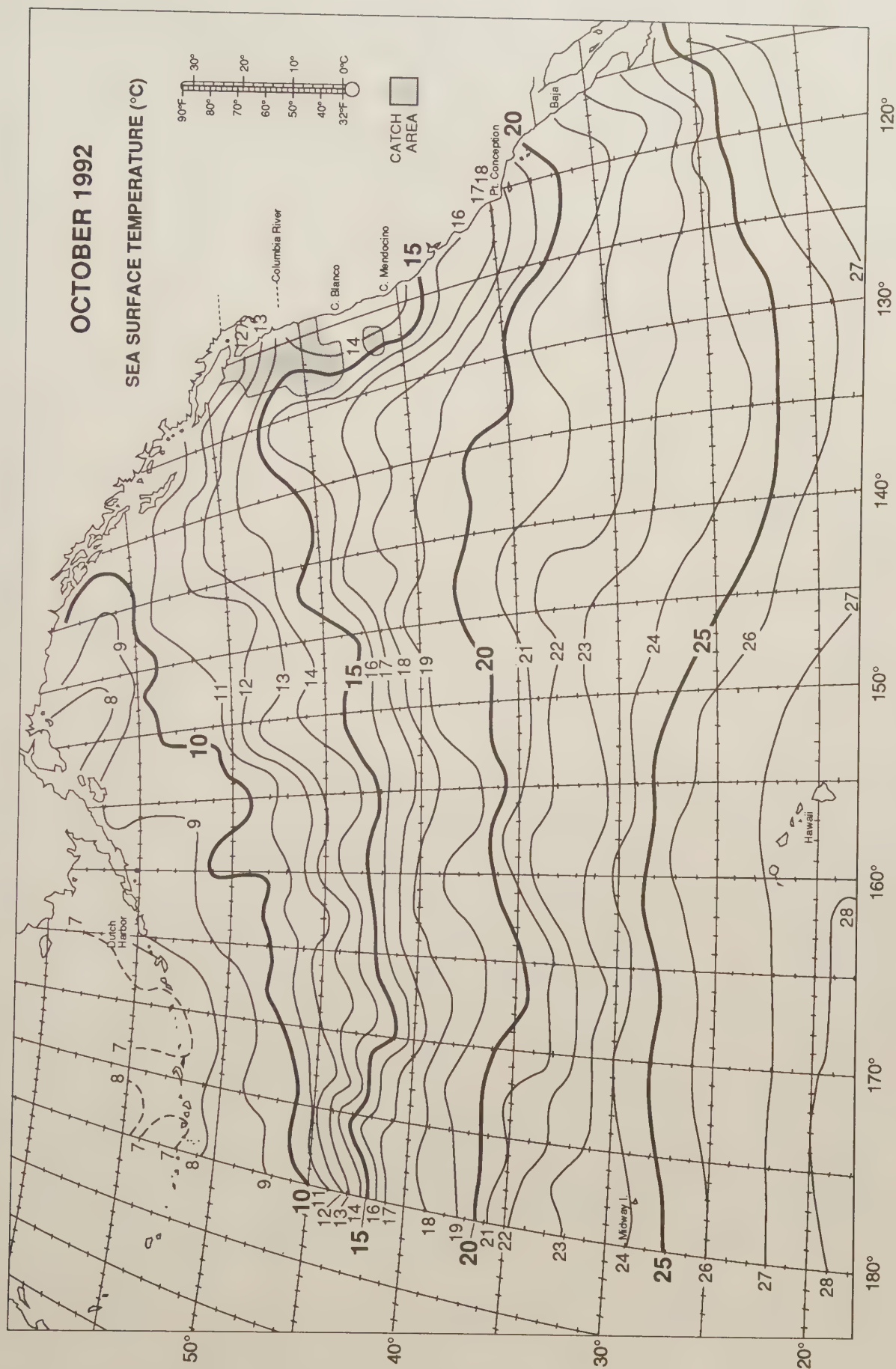


Figure 8d. Average sea-surface temperature (SST) isopleths ($^{\circ}\text{C}$) and U.S. albacore catch area for the north Pacific, October 1992.

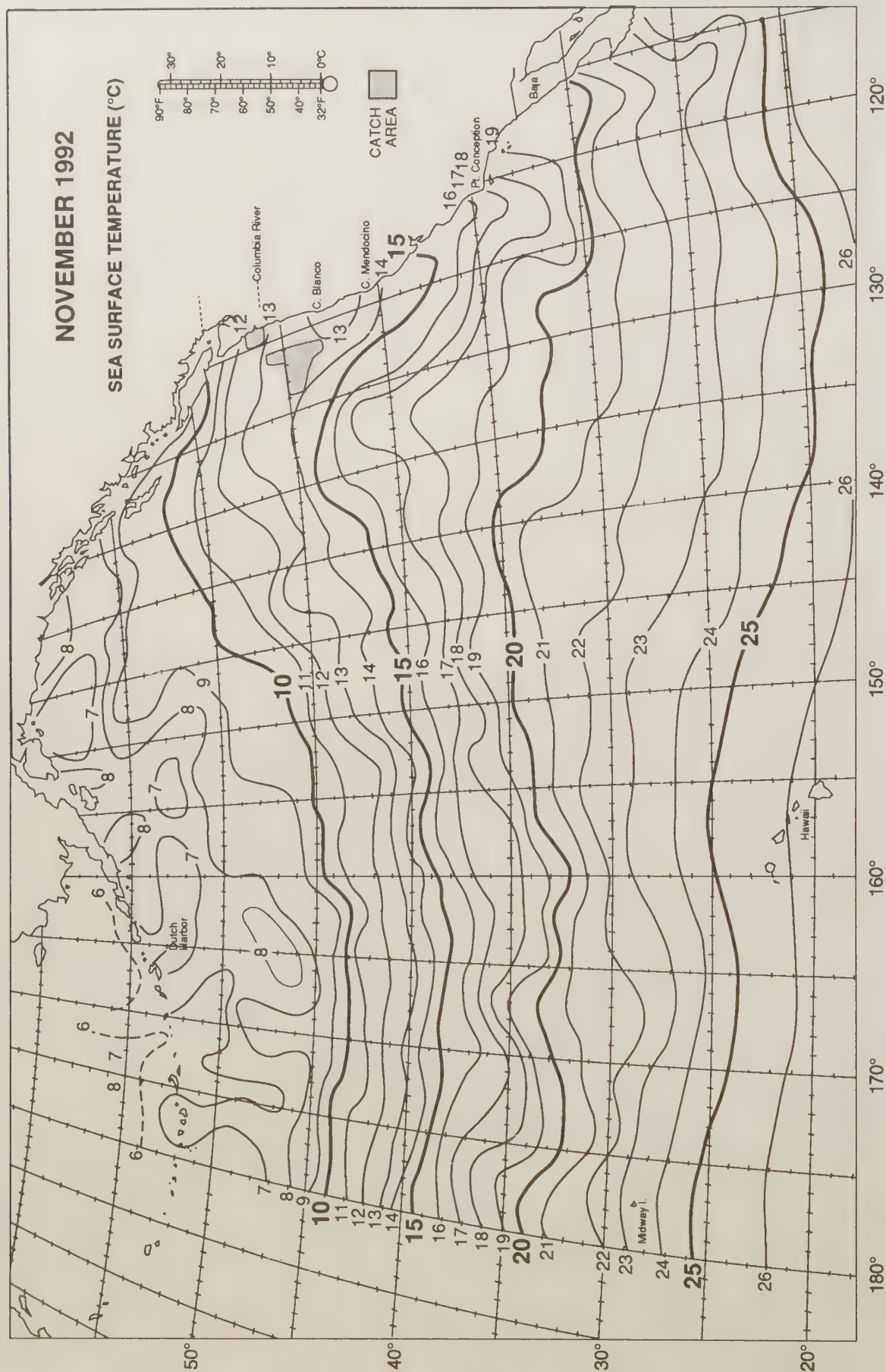


Figure 8c. Average sea-surface temperature (SST) isopleths (°C) and U.S. albacore catch area for the north Pacific, November 1992.

